THE GAS JOURNAL

DECEMBER 16, 1931

Vol. 196 83rd Year No. 3578

A Glance at the Contents—

Gas Firing of Pottery.

An article describes what the Gas Department of the Stoke-on-Trent Corporation, under the direction of the Engineer and Manager, Mr. A. Mackay, is doing, and has already achieved, in gas firing for the pottery industry. [p. 740.]

New Showrooms at Stockport.

On Dec. 7 Sir Thomas Rowbotham, J.P. (Chairman of the Gas Committee), formally inaugurated new showrooms of the Stockport Gas Department. The premises are situated in St. Petersgate, occupying one of the most valuable sites in this thoroughfare. [p. 733.]

Panel Heating.

We publish an illustrated description of a panel heating system in the draughtsman's office of an engineering firm in Westminster. This is an interesting installation in which there are about 160 cast-iron "Rayrad" panels fired by a Potterton boiler plant. [p. 729.]

Burton Call in Expert.

An important discussion on the position of the Burton-on-Trent Gas Undertaking took place at a meeting of the Town Council, when a recommendation was carried that Mr. Frank H. Jones, M.Inst.C.E., be appointed an expert to advise upon the position of the undertaking. [p. 722.]

Effect of Earthquake in New Zealand.

An interesting article to-day gives some idea of the very extensive damage done to the local gas undertaking as a result of the recent terrible earthquake disaster in Hawkes Bay, New Zealand. A number of photographs give an impression of the magnitude of the catastrophe. [p. 723.]

Low-Temperature Radiant Heating.

An abstract is given of a paper by Mr. A. H. Barker before the Institute of Heating and Ventilating Engineers. The author suggests "a method of calculation of rooms heated by low-temperature radiation which appears to be more in conformity with scientific principles than the rule-of-thumb methods hitherto generally adopted." [p. 734.]

Nomogram for Reduction of Gas Volumes.

Mr. D. G. Bagg, of the Fulham Station of the Gas Light and Coke Company, gives a nomogram constructed for the reduction of moist gas volumes to 30 in. pressure (saturated with water vapour) and 60° Fahr. The nomogram consists of three scales representing respectively the pressure, tabular number, and temperature, the tabular number scale being also graduated with the logarithms of the "gas volume factors" (the reciprocals of the tabular numbers). The use of the nomogram depends upon the fact that a straight line joining a given pressure and temperature cuts the remaining line at a point corresponding to the tabular number for that pressure and temperature. [p. 731.]

Attractive Gas-Works.

A photograph of the Middleton Gas-Works shows how attractive gas-works can be made, granted a little available space and some enterprise. [p. 729.]

Meter Rents at Nottingham.

At the last meeting of the Nottingham City Council a report was presented by the Gas Committee recommending the abolition of meter rents and a reduction in the price of gas amounting approximately to 1d. per 1000 c.ft. An amendment moving the omission from the report of the clause relating to meter rents was carried, and the question was referred back to the Committee. [p. 721.]

Jubilee of Messrs. William Sugg & Co., Ltd.

Though the business had been an active one for a long time before then—having been founded in 1837—it was on June 30, 1881, that the incorporation of Messrs. William Sugg & Co., Ltd., took place. The jubilee of this important event in the history of the firm was celebrated at the Holborn Restaurant last Wednesday, when a party of about one hundred sat down to dinner. Mr. Philip H. Sugg (the Chairman of the Company) presided. [p. 720.]

East Surrey Co-Partnership.

At the general meeting of co-partners of the East Surrey Gas Company, many long service certificates were presented, including three to Messrs. W. Lees Stenning, J.P. (Chairman of the Company), and G. R. Hunt, J.P., and H. Stacey (Directors). Mr. W. H. Bennett, Managing Director, mentioned that the total length of service of those who had received certificates, including the three Directors, was 962 years, and the average length of service was over 32 years, a record of which they might well be proud. [p. 721.]

Stockport's Progressive Gas Department.

Tuesday of last week marked the completion of a scheme of development which has modernized the Stockport Gas Department. Sir Thomas Rowbotham, J.P. (Chairman of the Gas Committee), formally inaugurated a new waterless gasholder at the Portwood Works, and Councillor James Hardman, J.P., set to work a "Dri-Gas" plant. The holder has a capacity of 3 million c.ft., and was erected by Messrs. R. & J. Dempster, Ltd. The rated capacity of the gas drying plant, which is by Messrs. W. C. Holmes & Co., Ltd., is 5 million c.ft. a day. [p. 728.]

Scottish Junior Association Visit Meter Works.

On Saturday, Nov. 21, the Scottish Junior Gas Association, Western District, visited the Edinburgh Works of Messrs. Thomas Glover & Co., Ltd., gas meter manufacturers. Mr. A. W. Sharman, the Chief Chemist from London, followed the visit with a lecture on the "Making of a Dry Gas Meter." All the points outlined were illustrated by means of a film which gave details of the process of construction of a meter, together with films showing an aerial view of the London works and machines producing the parts necessary for the assembly. [p. 735.]

EDITORIAL NOTES

A Terrible Experience

WHEN news was flashed to this country at the beginning of last February of the earthquake which had wrought such havoc in the Hawkes Bay District of the Nortn Island of New Zealand, there was deep sympathy with those in the Dominion who had been stricken by the blow. It was a disaster of a character which people in this country, where anything of the kind is unknown, found it hard to visualize. But we did know—with hundreds killed, hundreds more seriously injured, and incalculable damage to property—that the suffering must be enormous; and we knew also that it would be a time of Golden Deeds.

This week's number of the "JOURNAL" carries our readers farther into the history of the catastrophe; for Mr. Archibald Dougall, now a Director of Messrs. Dougall, Coombs, & Co., Ltd., and formerly Engineer to the Wellington Gas Company, writing from New Zealand, describes the earthquake, particularly as it affected the gas undertakings in the district involved. We have our own troubles here, but they are not as those of Napier and Hastings, which could be overcome only by indomitable courage and unswerving determination. To this courage and to this determination Napier and Hastings owe the fact that, with the exception of some abnormal leakage in the former city, the gas supply is again quite normal. We join with the writer of the article in congratulating Mr. L. Pickering (General Manager and Engineer of the Napier Gas Company) and Mr. H. C. Thompson (the Secretary), together with their staff, on the wonderful work they have successfully carried through under conditions of a magnitude fortunately seldom met with by gas men in any part of the world. Other places also suffered—among them Gisborne, where the Engineer and Manager of the Gas Company, Mr. O. Prince, had a very strenuous time for several days; Waipawa, where the Manager of the Municipal Gas-Works, Mr. T. H. Talbot, had to cope with damage to his retort house; and Wanganui, where Mr. W. J. Stone, Engineer and Manager of the Municipal Gas-Works, experienced trouble from flooding. One of our pictures shows the Hastings gasholder being inspected by the Works Manager, Mr. Baker.

In less than two minutes, everything in Napier and Hastings had turned from prosperity to chaos. On a beautiful summer morning, just when shops and streets were filled with people, and business was being carried on as usual in every direction, the earthquake commenced, at a few minutes before eleven, with a swaying motion, which, as Mr. Dougall says, "greatly increased in intensity until the final burst came, which appeared to rock the whole earth—the first shake lasting between 1½ and 2 minutes." In this brief space, over 300 people had been killed, and over 1000 seriously injured, while buildings of every description had crashed to the ground like houses of cards. For several days the shakes continued, some of which were quite as violent as the first earthquake, while some were considered even worse. The annual meeting of the Napier Gas Company had been fixed for 11 o'clock, exactly ten minutes after the earthquake shock, and both Directors and shareholders had commenced to assemble. Fortunately all, including the office staff, escaped safely into the street before the severe shocks occurred. The damage to the plant, which includes a bench of Glover-West vertical retorts, is described in the article. From this one can realize in some measure the extent of the task which confronted Mr. Pickering, who, in his trial, was fortified by offers from nearly every gas undertaking in New Zealand, to place at his disposal the services of their engineers, staffs, or any materials or appliances that might possibly be of assistance to him.

A Quality Product

IT is becoming more and more recognized that for satisfactory "domestic" use coke must be supplied of suitable grading. No other single factor is so important as this. Mr. R. A. Mott, whose name is well known to our readers, includes in "domestic purposes" the use of coke in steam boilers, central heating and hot water boilers, smiths' hearths, and the open firegrate; and in a paper before the Institute of Fuel last week—an extract of which contribution is published in our columns today—he points out that for all such purposes hardness in itself is of no significance, but that size is the predominant factor. To provide an unsuitable coke is to create prejudice, for but little general knowledge exists among the public regarding the significance of size. Also, undue emphasis has been given to the reactivity of coke; work by the Midland Coke Research Committee showed that small differences in size for a particular coke gave greater variation in reactivity than was obtained with over a hundred "cokes" of the same size and ranging from wood charcoal to natural graphite.

If, then, we are to expand the sales of gas coke as they can be expanded, it is imperative that proper attention should be paid to coke sizing; and sooner or later we shall have to standardize gradings throughout the country, as was mentioned by Dr. E. W. Smith in his Address as Chairman of the Society of British Gas Industries. We shall also have to adhere to some agreed standards of coke quality—the foundation of improved business. There is no doubt that if the production of coke of (say) 5 p.ct. ash could be made more general its sale would be very greatly simplified. We believe that the Gas Industry could well afford to pay bonuses for clean coal, and to take greater pains in regard to coke quenching and cooling. It seems to us pointless to advertise coke for open firegrates and then in some instances to supply a fuel which, when placed on the fire, decrepitates and flies out into the room. We heard someone remark recently, "Of course, I should be willing to use gas coke if it were not for the fact that I regard my fireplace as a warming agent and not as a shooting gallery."

The query is raised by Mr. Mott whether the sellers of high-temperature coke do not suffer from an "inferiority complex," and he suggests that they could learn from the experience in selling low-temperature coke, the sale of which at relatively high prices has undoubtedly given an indication that a demand for smokeless fuel can be created and a high price charged. If there is such an "inferiority complex," its basis must lie in lack of faith in the high-temperature coke which is being marketed. Excellent smokeless fuel can be produced by high-temperature carbonization; there is no reason why there should be lack of faith in its virtues. If "quality coke" were universally put on the market—which is not the case to-day—there would be no difficulty in selling this uniform product, provided there was reasonable organization of sales. Mr. H. Singleton, of Huddersfield, recently put in a plea for the employment of coke salesmen by all gas undertakings having an output of over 150 million c.ft. This, we think, is a thoroughly business-like proposition. Trained coke salesmen are needed in the Industry.

Dr. Smith envisages specialized sales organization, and Dr. G. E. Foxwell, who from time to time contributes suggestive articles to the "JOURNAL," also looks forward to the formation of a national coke sales organization. And both agree that there should be collaboration and not animosity between the two industries which produce high-temperature smokeless fuel. Dr. Smith would like to see the country divided into areas—say, half-a-dozen in number—each with its own coke sales organization, working for domestic purposes where necessary with the

coke oven industry. Eventually every gas undertaking in such co-operative sales organizations would have to work to a broad specification. An organization such as is suggested by Dr. Foxwell would advertise and market solid smokeless fuel through district offices in every town of sufficient size in the country. Every sale of coke would be followed up by personal calls from a salesman, capable of demonstrating to the purchaser the best methods of using the fuel. As part of the advertising allocation, gas pokers would be fitted and supplied free with the first ton or possibly half-ton order; and coke stoves specially adapted for coke burning would be supplied and fitted at cost price and upon hire-purchase terms.

The gist of the foregoing is easily expressed: Ensure a smokeless fuel of uniform high quality; sell it in a modern manner.

An Amalgamation Bill

Among the notices given for Private Bills for the forthcoming session of Parliament, those relating to gas, though not numerous, are in several instances of a specially interesting character. One of them is a Bill to provide for the transfer to the South Suburban Gas Company of the undertakings of the Sevenoaks Gas Company and the Tonbridge Gas Company. The area of supply of the South Suburban Company adjoins that of the Sevenoaks Company, and, in turn, the area of supply of the Sevenoaks Company adjoins that of the Tonbridge Company. The South Suburban Company have agreed with the two Companies named for the acquisition of their respective undertakings upon terms set forth in the Bill.

There are clauses regulating the price of gas in the two districts, and the compensation provisions include one to the effect that "the Company shall pay to any person (other than a staff officer) who is in the employment of the Sevenoaks Company or of the Tonbridge Company at the date of transfer, and who is not taken over by the Company, compensation in accordance with the provisions of the scheme of the National Joint Industrial Council dated April 29, 1930, relating to compensation for loss of employment on the amalgamation of gas undertakings."

A Novel Competition

Though they have specialized for over a century in the requirements of the Gas Industry, Messrs. Newton, Chambers, & Co., Ltd., of the Thorncliffe Iron-Works and Collieries, near Sheffield, are full of youthful enthusiasm and fresh ideas, and we would particularly congratulate them upon their latest plan for stimulating interest in the many-sided and fascinating aspects of gas engineering.

As will be noted from an article appearing elsewhere in this issue of the "Journal," a Christmas competition on altogether novel lines has been instituted by them, with the idea of bringing home to the mechanically minded young men in the Gas Industry the scientific interest attaching to the design, construction, and operation of gas-works. The competition will provide an attractive occupation for the holidays, and it will prove of real value to the Industry should it do anything to counteract that mental attitude the firm have sometimes come in contact with, "which, while in advance of the old conception of gas engineering, is still inclined to look upon it as an inexact science, operating massive but practically inert plant, and offering a far less interesting study than, for example, electrical engineering."

The competition is to construct a model of a gas-works layout and provide an accompanying description of the layout; marks being given, for the purposes of adjudication, under three heads: For the general construction of the model; for the layout of the works, to allow the most convenient and economical working; and for the description of the works and the reasons for the particular apparatus and layout chosen, having regard to economical and convenient working. Substantial monetary prizes are offered, and the judging will be in the capable hands of Mr. George Evetts, M.Inst.C.E. Later on, when he has performed his task, as we know he will do to the satisfaction of the competitors, we shall hope to be afforded an opportunity of devoting further space in our pages to the competition.

We understand that to the engineers of all but very small works the firm are sending particulars of the competition and prizes, the necessary material from which a model of a fully-equipped gas-works can be built, and a photograph of two views of a model built from identical materials. Should more than one member of the staff desire to enter the competition, the promoters signify their readiness, so far as supplies will allow, to forward one other set of the necessary material upon application.

We have had the advantage of discussing the matter with Lieut.-Col. H. W. Woodall, who is a Director of Messrs. Newton, Chambers, & Co., and we are in full agreement with him that in the rising generation of gas engineers the Industry needs the very best brains that can be got. In the way of discovering ability and of creating interest the competition should do much, and we therefore hope—as we indeed expect—to hear that it is an unqualified success.

A Lengthy Audit

Since July, 1930, the Auditors have been engaged, with a large staff, sifting the accounts of the Irish Free State Electricity Supply Board, in connection with the Shannon Scheme, "but," says the "Independent," "so numerous were the imperfections that the work has not yet concluded." This, no doubt, explains the delay in the issue of the Board's accounts for the twelve months ended March, 1930. After a lapse of a year and eight months, these are available, but make cheerless reading. Over the twelve months named, the actual income from consumers amounted to £478,000, and the profit and loss account showed a deficiency of £35,090. The scheme is a comparatively young one, and nobody would wish to judge it too strictly on these early results. They are, however, important as showing how easy it is to be oversanguine with regard to projects of this magnitude.

The report of the Auditors is an extraordinary document, and indicates imperfections in the methods of account-keeping, which will, of course, be at once made good, though the task will be a big one. The Board themselves admit "that the system in operation in the Stores Department, which was intended to control a very substantial portion of the Board's expenditure, had broken down;" and they add that the work of the Auditors, doubtless largely owing to this fact, "has cost the Board £7500." By the end of March, 1930, it seems, "the whole recording machinery had fallen into very considerable arrear, and this situation was aggravated by the circumstance that much of what had been done was imperfect and unreliable."

The accounts themselves show that at March, 1930, the number of consumers in towns and areas supplied by the Board was 47,229, and of these 40,256 had been actually changed over to the Shannon system—the remainder continuing to receive their supplies from local generating stations. We gather that the number of units of electricity sold to consumers was 43,177,228 *plus* 4,323,467 units for public lighting, making a total of 47,500,695 units, as compared with 60,947,775 units generated. These figures do not represent the full demand, because certain undertakings which had not been acquired by the Board at March 31, 1930, generated 20,760,869 units, and sold 18,466,959 units. According to the "Independent," President Cosgrave lately stated that "the estimated demand of 150 million units has been reached." As to this, our contemporary comments: "It is hard to reconcile this statement with the figures disclosed in the Board's report, giving a total consumption of 65,967,654 units for 1929-30. We cannot conceive that within a year and eight months consumption has been more than doubled, unless there is some serious omission from the particulars furnished in the Board's report."

With all this before us, and a great deal more, we are unable to feel surprise that the Board should have decided recently to make an addition of 25 p.ct. to charges for current.

PERSONAL

On inquiry yesterday morning, we were delighted to learn that Sir FRANCIS GOODENOUGH had so far recovered from his unfortunate attack of illness as to be able to leave town for the Kent Coast, and that he hopes to be able to resume work early in the New Year.

At the Loughborough Town Council meeting last week, congratulations were tendered to the Gas Manager, Mr. EDWARD ONIONS, on his having completed 50 years' service with the Gas Company and the Corporation. Mr. Onions has been connected with the undertaking for half the period of its existence.

Mr. ISRAEL GEORGE, an old servant of the Wolverhampton Gas Company, who met with an accident during the early part of the year, was on Friday presented with a cheque for £60, being a grant from the National Union of General and Municipal Workers, from the Union for total disablement. In making the presentation Mr. Thomas Hurley (District Secretary) commended the Wolverhampton Gas Company for finding Mr. George employment up to his 77th year, and regretted the circumstances that compelled him to cease.

Mr. GEORGE ERNEST CURRIER, Manager of the Meadow Lane Works of the Leeds Gas Department, was on Dec. 11 recommended by the Bradford Gas Committee to be the new Deputy Gas Engineer for the City of Bradford, in succession to Mr. E. Crowther. Mr. Crowther, who came to Bradford as Deputy some four or five years ago, is now Gas Engineer and General Manager, in succession to Mr. E. J. Sutcliffe, retired. Mr. Currier, who was selected out of 72 applicants, is 37 years of age and has been in the Gas Industry for 20 years. He is a native of Birmingham, received his early training in the Industry there, and has been at Leeds for the past six years. The Bradford Deputy Engineership carries a salary of £700 per year.

CORRESPONDENCE

Gas Dehydration by the Glycerin Process

SIR,—May I congratulate the authors of the excellent paper on the Theory of Gas Drying, an abstract of which appeared in your issue of Dec. 2?

Being particularly interested in dehydration by the glycerin process, however, I venture to state that the practical experience gained at Ilkeston over the past nine months does not substantiate the views expressed by Mr. Hawes on the working of this process. The statement that the whole bulk of the glycerin has to pass through the evaporator is misleading. The plant we have in operation is of ¾ million c.ft. capacity, and our bulk supply of glycerin is in the region of 240 gallons, yet it is only necessary to pass on an average 30 to 40 gallons per day through the evaporator. There is no apparent depreciation in the original stock of glycerin.

The following figures show the number of hours it has been necessary to work the evaporator in order to maintain a specific gravity of 1·26 in the final bay of the washer:

March	56	August	105½
April	80	September	130¾
May	66¾	October	157¾
June	92	November	117½
July	115	Total	921¼ hours

During this period 98·5 million c.ft. of gas have been treated, which gives a figure of approximately 0·01 hour's evaporation per 1000 c.ft. The running costs of pumping and evaporation are 8·2d. per hour, which includes power, process steam, cooling water, supervision, and maintenance. This works out at 0·082d. per 1000 c.ft.

I think Mr. Hawes will agree that this dispels his theory of high pumping costs.

W. OLDHAM,
Assistant Engineer and Manager.

Gas-Works, Ilkeston,
Dec. 11, 1931.

Refrigeration

SIR,—We note that the Minister of Health in the House of Commons informed Mr. Roland Robinson that he had no authority to make it a condition of any future subsidy that refrigerators should be installed in working-class flats, and that he doubted whether it would be justifiable or practicable.

As the Architects of a large number of flat buildings we have installed refrigeration in recent years in flats let at rents varying from £90 to £900 per annum, and regard refrigeration of some kind as a *sine qua non* of a modern building, although its installation may still be difficult owing to the cost of a good refrigerating unit.

Refrigeration is so extremely advantageous in a widely different number of ways that we think it desirable that the public should realize its advantages. We have found them to be as follows:

(1) It has been possible to economize in space previously occupied by larder accommodation.
(2) The careful mother finds great satisfaction in the certainty that milk and other articles of diet and invalids' and children's food can be entirely free from risk of contamination.
(3) Food in the house at week-ends need no longer be thrown away if a country visit is contemplated, and is safely preserved from Friday until Monday.
(4) In summer many cold dishes can be brought to the table in extremely appetizing and attractive condition, and the lukewarm state of food which is objectionable to many people is entirely eliminated.

We think it would be of the greatest advantage if opinions could be obtained on food preservation from eminent authorities of medicine and hygiene, and it would be a public service if you could quote authoritatively from these sources for the benefit of all those who are interested in hygiene and housing in its highest sense.

T. P. BENNETT.

T. P. Bennett & Son,
Architects,
41, *Bedford Row, W.C.* 1,
Dec. 14, 1931

Low-Temperature Carbonization

SIR,—Col. Bristow's methods in controversy are admirably illustrated by two consecutive paragraphs in his letter of Nov. 26.

In one paragraph, he quotes the Civil Lord of the Admiralty as saying:

> "I hope that in the very near future it will be possible to obtain supplies of oil from our coal at a price which will give a tremendous fillip to the coal industry of this country."

In the next paragraph, Col. Bristow writes:

> ". . . the Admiralty could not have hoped to give 'a tremendous fillip to the coal industry of this country' by the use of low-temperature oil unless they were determined to use a large quantity of such oil in the future."

To the Civil Lord, it is *price* that will give the fillip: to Col. Bristow it is the Admiralty!

H. T. KEMP.

1, *Linzee Road,*
Hornsey, N. 8,
Dec. 9, 1931.

[This correspondence is now closed.—ED., "G.J."]

THE NEWS OF THE WEEK

Showrooms are Being Built by the Llanidloes Gas Company, Ltd., and will be opened about the end of January next.

The Motherwell and Wishaw Town Council have decided to build new offices at the gas-works at a cost of approximately £3000, while the Gas Manager has been asked to prepare a report setting forth his views in regard to the provision of a showroom including the question of a site and the activities to be associated with a showroom.

The Annual Exhibition of scientific instruments and apparatus, arranged by the Physical and Optical Societies, will on this occasion be held on Jan. 5, 6, and 7, 1932, at the Imperial College of Science and Technology, South Kensington, S.W. 7. It will be open in the afternoons from 3 p.m. to 6 p.m. and again in the evenings from 7 p.m. to 10 p.m.

One of the Largest Pieces of Metalwork of its kind that has ever left this country was despatched last week from the works of Messrs. Thomas Piggott & Co., Ltd., Spring Hill, Birmingham. It is a high-pressure gas container, made of 1¼ in. steel. It is 56 ft. 4 in. long and 4 ft. in diameter, while the weight is 17 tons. The order of which it forms part was secured from Japan by the Birmingham firm in face of world-wide competition.

Gas Progress in Turkey.—According to a report lately to hand, the sales of gas by the Société du Gaz de Stamboul during the nine months ended September last amounted to 29,440,000 c.ft., compared with 19,732,000 c.ft. in the corresponding nine months of 1930, the number of consumers increasing during the same periods from 1168 to 1754. The sales of gas by the Société du Gaz de Kadikeuy during the same periods increased from 66,046,000 c.ft. to 73,494,000 c.ft., and the number of consumers from 2712 to 2844.

The Isle of Wight County Council have considered the provisions of the Shanklin-Ventnor Gas Order under which the gas undertaking of the Ventnor Gas and Water Company is to be transferred to the Shanklin Gas Company, and the limits of supply of the Shanklin Gas Company are to be extended. After careful consideration, it has given notice of an objection to the draft order on the grounds that there is no justification for the high price which it is proposed should be charged in the Ventnor limits as compared with the price charged in the Shanklin area and also in the area supplied outside the parish of Shanklin.

A Drawing Book for school children has been published by the British Commercial Gas Association, the subjects for sketching being some of the beautiful trees that are to be found in the English countryside. The subject is a good one, for in a foreword the book explains how the trees of millions of years ago in the primeval forests sank into the earth through the centuries, slowly decayed, and changed into coal from which to-day we obtain our gas and other valuable bye-products. A central spread to the book tells in pictorial form the story of gas, while on the back cover is the family tree of "Old King Coal" indicating by branches the main bye-products of the Gas Industry.

Unnecessary Public Expenditure.

The following resolution was passed at meeting of the Executive Committee of the Federation of British Industries on Dec. 9:

"The Federation of British Industries, in view of the urgent need for national economy, would urge most strongly upon His Majesty's Government that the proposed re-valuation as provided under the Rating and Valuation Act, 1925, should be postponed. It is understood that this would entail a public expenditure of £1,200,000, to which would have to be added the consequential heavy expenses of ratepayers; and in view of the present national situation, the Federation considers that greater national advantage would result from the saving of so large a sum than could accrue through proceeding with a re-valuation at the present moment. The Federation would therefore ask that legislation should be introduced postponing the re-valuation until the year 1933."

Presentation to Mr. Henry Gage.

An interesting ceremony took place on Thursday, Dec. 3, at the Social Room, Sutton Gas-Works, when a canteen of cutlery was presented by the staff and workmen to Mr. Henry Gage, Engineer and Manager of the late Sutton Gas Company.

Mr. J. Davis, District Superintendent, in making the presentation, said that they all knew the happy relations which existed between the management and the employees of the late Sutton Gas Company. Mr. Gage's good qualities were well known, and the speaker stated that he was sure that they could not have been such a happy family without Mr. Gage's kind help.

Mr. W. Mewett, Hon. Secretary, on behalf of the Sports and Social Club, said that Mr. Gage had been Chairman since its inception, and they owed many of the advantages they enjoyed to-day to his untiring efforts on their behalf. He never went to Mr. Gage for advice and help and returned empty-handed. He wished Mr. Gage all success in his new office, and hoped that he would still maintain his position as Chairman.

Mr. Jewett, on behalf of the works, stated that Mr. Gage had been a faithful "Guv'nor."

Mr. Graham, for the fitters, said that they were very pleased to take part in the presentation; and it carried with it the good will and esteem of the whole of the Fitting Department.

Mr. Butcher, on behalf of the Mains and Services Department, added his appreciation of the kindness and understanding they had always received at Mr. Gage's hands.

Mr. Stredwick, late Secretary, endorsing the remarks of the previous speakers, said he was a very strong believer in the law of appreciation. During the short time he had been at Sutton, he got to know Mr. Gage very well, and he agreed with Mr. Davis that Mr. Gage was a "jolly good fellow."

Mr. Davis, in making the presentation of the canteen of cutlery on behalf of the staff and employees, said that it carried with it the best of good wishes for his future welfare.

Mr. Gage, responding, said he was sure that no one could hope to earn greater appreciation than had been shown that evening. The ten years he had been with the Sutton Company had gone very quickly. They had been very happy years. He had been happy in the work which he had been called upon to do in the reconstruction of the Sutton Works and the extensions on the district, so that the business of the Company had been practically doubled during that period. He realized that no man controlling a Company such as the late Sutton Gas Company could wish to have a better set of men to work with; and he felt confident there was no gas-works in this country where a better feeling existed between the management, staff, and employees.

He thanked Mr. Davis and the other gentlemen who had so kindly expressed the feelings of the Sports Club, Distribution, &c., and assured them of his assistance whenever possible in the future.

The proceedings terminated with musical honours.

Forthcoming Engagements.

Dec. 17.—SOCIETY OF BRITISH GAS INDUSTRIES.—Council Meeting in the afternoon.

Jan. 9.—SCOTTISH JUNIOR ASSOCIATION.—Joint Meeting in Edinburgh. Address by Mr. T. M. Ashford, Senior Smoke Inspector, Glasgow.

Jan. 9.—LONDON AND SOUTHERN DISTRICT JUNIOR ASSOCIATION.—Visit to the Home Office Museum, London.

Jan. 9.—WESTERN JUNIOR ASSOCIATION.—Meeting in Exeter. Paper by Mr. J. H. Dyde on "Coke in Relation to its Domestic Use."

Jan. 29.—LONDON AND SOUTHERN DISTRICT JUNIOR ASSOCIATION.—Meeting in London. Paper by Mr. Roy Summerson, "Exhausting and Governing Gas from Retorts."

THE NEWS—*continued.*

National Gas Council.

Meeting of Central Executive Board.

A Meeting of the Central Executive Board of the National Gas Council was held at 28, Grosvenor Gardens, London, S.W. 1, on Dec. 8. In the absence of Sir David Milne-Watson, the chair was taken by Mr. William Cash, F.C.A. (Vice-Chairman).

The Late Sir Hallewell Rogers.—Before proceeding with the business of the meeting, the Chairman referred to the loss the Industry had sustained in the death of Sir Hallewell Rogers, who had been one of the original members of the National Gas Council when it was formed in 1916, and was at that time Chairman of the Birmingham Corporation Gas Department. Upon his retirement from municipal life he became an Hon. Member of the Council, and one of its Trustees. He had been a strong supporter of the work of the Council, and had rendered considerable assistance at a critical period in the history of the Industry. A vote of sympathy with his relatives was passed, all standing.

Parliamentary.—The provisions in the Bill which is being promoted by the Kettering Gas Company for the purpose of preventing the Urban District Council of Kettering from restricting the rights of tenants in Council houses to take a supply of gas were reported and considered.

Mains and Cables in Highways.—It was reported that, at a meeting of the Negotiating Committee, consisting of representatives of Gas and Electricity Undertakings on the one hand, and of the Highway Authorities on the other, which had taken place on Nov. 18, a unanimous decision had been reached to continue the negotiations with regard to mains and cables in highways, despite the fact that the conference convened on Nov. 13 by the Ministry of Transport had decided to recommend the appointment of a Departmental Committee to consider kindred questions. Considerable progress had been made by the Negotiating Committee, and detailed instructions had been given to Counsel for the purpose of drafting a satisfactory clause.

Institute of Municipal Treasurers and Accountants.—It was agreed that the Council should join with the Institution of Gas Engineers in accepting a request from the Institute of Municipal Treasurers and Accountants to meet their representatives for the purpose of discussing the question of wear and tear allowances in gas undertakings; and representatives were appointed for this purpose accordingly.

British Standards Institution.—It was reported that Dr. Colman had been approached, and had agreed to represent both the Institution of Gas Engineers and the National Gas Council on the Chemical Divisional Council of the British Standards Institution.

The financing by the Gas Industry of the Chemical Divisional Council and other Sub-Divisions of the British Standards Institution was considered, and the matter was deferred in order that the officers of the Council might consult the Institution of Gas Engineers on the matter and prepare a recommendation for the further consideration of the Board.

Federation of British Industries.—The following representatives of the Council were unaimously re-elected to serve again on the Grand Council of the Federation of British Industries for the ensuing year:

Main Group 9, Sub-Group 1.—Chemical Fertilizers and Explosives.

Mr. Chas. F. Botley.
Mr. Thos. Hardie.

Main Group 14, Sub-Group 3.—Public Utilities.

Sir Francis Goodenough, C.B.E.
Mr. H. C. Smith.
Mr. L. E. Clift.

Gas Exhibition at Oldbury.

An interesting exhibition of gas fittings and appliances in connection with the Oldbury Gas Department was held at Langley.

Councillor H. H. Robbins, Chairman of the Gas Committee, who presided, said the gas-works was the only trading concern of the Urban District Council, and the Gas Committee were prepared to supply an article of first-class quality at the lowest possible price. Their gas-works during the last 10 or 15 years had increased its output by about 50 p.ct.

Councillor H. Edwards, Chairman of the Council, in opening the Exhibition, said the gas service was one of the best in Oldbury, and it rested with the residents of the district to make it a continued success as a business concern. He congratulated the Engineer and Manager, Mr. J. Poulson, and his assistants for the excellent arrangements for the exhibition.

The exhibition included all the latest appliances. A novel feature was a scale model of the latest type of gas-holder and a working model of the plant similar to that installed at the Oldbury Gas-Works.

A Jubilee Celebration.

The Fifty Years of Messrs. William Sugg & Co., Ltd.

Though the business had been an active one for a long time before then—having been founded in 1837—it was on June 30, 1881, that the incorporation of Messrs. William Sugg and Co., Ltd., took place. The jubilee of this important event in the history of the firm was celebrated, in "happy-family" fashion, at the Holborn Restaurant last Wednesday, when a party of about one hundred sat down to dinner. Mr. Philip H. Sugg (the Chairman of the Company) presided, while the duties of Master of Ceremonies were performed by Mr. Anthony Sugg (Secretary and Director). Other Directors—Messrs. J. W. Lofts, W. Mattock, and H. J. Waller—acted as Vice-Chairmen. We stress the "happy-family" character of the gathering, because that furnishes the key to the whole policy of the firm—a policy which, as the Chairman pointed out, has enabled them to work full time, and to avoid paying off people either on the works or on the staff, during the recent trade depression. "Mr. Waller, Mr. Lofts, and Mr. Mattock," said Mr. Sugg, "all entered on their careers with the firm as boys; and entirely by their own efforts, by their untiring work on behalf of the Company, they have attained to seats at the Board. I think it is because of this that the firm is so prosperous. Their services have been of inestimable value. Our position to-day is greatly due to the foresight and encouragement of those who have been in control—and they are those who started with us as boys round about half-a-century ago."

The Founder of the Company.

On the wall behind the Chairman was hung an oil painting of the late Mr. William Sugg (the founder of the present Company), whose father was the founder of the original business in 1837—the year that Queen Victoria came to the throne. Mr. William Sugg died in February, 1907, after having, by his faith, courage, perseverance, and inventive genius, made a name for himself which is inseparable from the Gas Industry. His "London" argand burner was introduced in 1869, and was subsequently adopted as the standard test burner. He did a great deal of work in connection with photometry, and during the first great electric light scare about 1879, he rendered important service to the Gas Industry by the introduction of his "Christiania" flat-flame and other governor burners, which came to have a world-wide reputation. During the successive modern revolutions in gas lighting the firm took a leading part—first, with regenerative gas-lamps, then with upright incandescent gas-lights, and after that with inverted burners.

A Presentation.

The items of a first-rate musical programme (under the direction of Mr. Ashmoor Burch) were interspersed with speeches, mainly of a domestic character, which gave pleasing evidence of the good feeling and spirit of co-operation by which all ranks are animated. This spirit was further marked during the evening by the presentation by the staff of a handsome silver inkstand, suitably inscribed, to the Chairman and the Directors.

The presentation was made by Mr. Daniels, after the toast of "Prosperity to William Sugg & Co., Ltd.," and "The Chairman" had been enthusiastically honoured. The first of these toasts was submitted by Mr. H. J. Waller, who recited a number of interesting historical facts. He declared that the late Mr. William Sugg was always seeking improvement, and that no man had ever done more for the Gas Industry than he did. Beyond all this, he was beloved by his workmen. The principles inculcated by him the firm still endeavoured to carry out. The Chairman, in the course of his reply, quoted some wonderful records of long service with the firm—extending in one case to no less than sixty years. The toast of "The Chairman" was proposed by Mr. W. Mattock, and supported by Mr. S. E. Thornton; both gentlemen remarking on the fact that Mr. Philip Sugg had endeared himself to all engaged in the firm just as had his father before him. The remaining toast was that of "The Visitors," which was proposed by Mr. J. W. Lofts, and responded to by Mr. Alfred Harrison, Mr. J. C. Walker, Major Spittle, D.S.O., and Mr. R. Topple.

Scottish Junior Gas Association (Eastern District).

Thirty members of this Association assembled in the Burgh Council Chamber, Dunfermline, on Saturday, Dec. 5, to hear an address on papermaking by Mr. G. H. Gemmell, of Messrs. Gemmell & Thin, Edinburgh. Mr. D. Garrie occupied the chair and introduced Mr. Gemmell to the members.

After the discussion the members assembled in the Bruce Restaurant, where lunch was served. A special 'bus then conveyed the company to Messrs. Caldwell's Paper Mill at Inverkeithing, where Mr. Alfred W. Smith, Assistant Managing Director, and members of his staff conducted parties over the paper mill and explained the various manufacturing processes in operation.

Salford's Experiment in Creosote Oil Fuel for 'Buses.

The Salford Transport Committee have decided to run two Corporation motor-omnibuses on creosote oil fuel in place of petrol as an experiment with a view to converting similarly the entire service. The cost of the new oil fuel is approximately 4¾d. per gallon as against 1s. 4½d. for the best petrol.

Mr. J. S. D. Moffet, General Manager of the Salford Transport undertaking, told a "Manchester Guardian" representative that Salford is the first Corporation in Great Britain to use this oil fuel, which has already been taken up by the Belfast General Omnibus Company with highly satisfactory results. The oil is a purely home product, and, should the experiment prove successful, the result will be the launching of an important new industry.

East Surrey Co-Partnership Progress.

The general meeting of co-partners in connection with the East Surrey Gas Company was held at the Small Market Hall, Redhill, on Nov. 26. The growth of the scheme recorded was a matter for congratulation, and the presentation of long service certificates aroused considerable interest and enthusiasm, while certificates (supplemented by prizes given by the Directors) awarded to successful students at the examination of the City and Guilds of London Institute (Department of Technology) held in connection with the classes at the Redhill Technical Institute were also presented. Mr. G. R. Hunt, J.P. (Chairman of the Committee), presided, and there were also present Messrs. W. Lees Stenning, J.P. (Chairman of the Company), W. H. Bennett (Managing Director), Harrie Stacey, J.P., J. Urquhart (Directors), Horace Long (Secretary to the Committee and to the Company), Ernest Scears (Engineer), Arthur Tennant (Sales Manager), and co-partners from Redhill, Reigate, Godstone, Lingfield, Walton-on-the-Hill, and Dorking.

The Committee, in their 18th annual report, stated that the number of co-partners registered at June 30 last was 224. The bonus and interest for last year amounted to £1895, and the deposits on savings account were increased by over £370, having reached a total of £1444. Interest on deposits was paid at the rate of 5 p.ct. per annum. Co-partners had invested in the Company's capital stock during the year the sum of £2470, an advance of more than £400, and the stock held under the scheme up to June 30 last amounted to £11,500, or an increase of £1805. Transfers of stock after that date had brought the total up to £13,230, divided among 208 co-partners holding, on an average, £68 12s. per head.

In moving the adoption of the report and accounts, the Chairman stated that the latest statistics on co-partnership throughout the country showed that, up to the end of 1930, 59 gas undertakings had introduced co-partnership schemes. The combined capital of those undertakings amounted to nearly 85 million pounds. The 44,000 co-partners concerned held between them shares and deposits exceeding three million pounds; and the distribution of benefits under co-partnership had been not far short of 4½ million pounds.

Mr. A. W. Skeggs seconded the motion.

A Co-Partnership Industry.

Mr. W. H. Bennett said that it was significant that 50 p.ct. of the output of gas by Gas Companies in this country was made under co-partnership conditions; he thought it was the one industry in the country that could make that bold statement. Those who were shareholders in the Company had noted with satisfaction that the dividends paid in September showed an increase of ¼ p.ct. per annum. They had during the past year been able to make a reduction in the price of gas amounting to a saving of well over £4000 a year to consumers, and the result was that they had been able to increase their dividends to the shareholders and as with that dividend, so with the co-partnership bonus; so that the co-partners had had the benefit both ways. If they could keep that up they would next June have a bonus of 5¾ p.ct. as against one of 5½ p.ct.

Mr. W. Lees Stenning presented long-service certificates to the following, the number of years of service being given in parenthesis: J. W. Ansell (26 years), W. Ansell (31), J. Bashford (26), B. J. Bryant (51), A. Butterfield (30), F. Clare (34), W. F. Cooke (25), E. Coomber (36), A. Copp (41), S. J. Ellwood (26), A. Friday (42), J. Friday (30), A. Gear (33), R. Gibson (36), G. Gray (31), J. Green (36), L. Heaysman (39), F. H. King (29), T. P. Knight (27), A. L. Leppard (25), W. Lofts (27), G. P. Lucas (25), J. Palmer (42), G. E. Porter (31), H. C. Simmonds (27), G. E. Tickner (28), W. J. Webb (29).

Mr. Urquhart pointed out two or three others who also had records for long service. The Chairman of the Company, Mr. Stenning, was one of them, and Mr. Hunt and Mr. Harrie Stacey had also records of long service. Mr. Stenning had been a Director of the Company since 1896, and Chairman since 1920—[applause]—thirty-five years' service in all. They all gave service, he reminded them, from the highest to the lowest. Then Mr. Hunt, whom he might call the "Grand Old Man" of the Company, had put in thirty-nine years' service, and served sixteen years as Chairman of the Company. [Applause.] Mr. Harrie Stacey had twenty-five years' service, and had been Vice-Chairman of the Company since 1920. He thought nothing could illustrate better the spirit of co-partnership than for those three gentlemen to receive certificates in recognition of their long service, which he had much pleasure in asking them to accept. [Applause.]

Mr. Lees Stenning acknowledged the presentation on behalf of himself and his co-Directors, after which he presented certificates and prizes presented by the Directors to students who had passed the City and Guilds of London Institute and other examinations in gas fitting, typewriting, workshop drawing, and building science.

Nottingham Prices and Meter Rents.

At the last meeting of the Nottingham City Council a report was presented by the Gas Committee recommending the abolition of meter rents and a reduction in the price of gas amounting approximately to 1d. per 1000 c.ft. Although he moved the adoption of the report, the Chairman of the Committee, Sir Albert Ball, expressed his strong disapproval of the abolition of meter rents. With regard to prepayment meters it was proposed that a rebate should be allowed of 1¾d. in the shilling.

Sir Albert referred to the ambiguous position in which he was placed of having to move the adoption of the report, while disagreeing with a section of it. The proposal to abolish meter rents was, in his view, most damaging to a business undertaking. The undertaking could afford to reduce the price of gas, but to suggest the abolition of meter rents at a time when they were faced with a large increase in the price of coal, and when consumption was decreasing, was bad business. It would not help the working man or the small consumers, 90 p.ct. of whom used prepayment meters. As to others who were using large meters, they would prefer a reduction in the price of gas rather than the abolition of meter rents. The proposed step would mean a loss of £10,550 a year, £3400 of which was received from people who were not ratepayers and who lived in districts outside the city. The total abolition of meter rents was equivalent to 5 p.ct. interest on £210,000.

Mr. R. E. Ashworth, Vice-Chairman of the Gas Committee, who seconded, said that last year the Gas Undertaking made a net profit of £78,235, and after paying £31,000 in relief of rates it carried forward £47,050 to reserve, which now had £436,925 standing to its credit. The proposal would mean a saving of £6750 in the income-tax, so that they would have to find little more than £4000.

Alderman Sir Bernard Wright urged that the Council ought not to throw away any substantial revenue at such an

THE NEWS—*continued.*

anxious time. He moved the omission from the report of the clause relating to meter rents.

Alderman R. A. Young seconded the amendment.

Alderman W. Halls opposed the amendment, and Alderman H. Bowles said that abolition of meter rents would relieve burdens upon the poorest consumers.

Sir Bernard Wright's amendment was carried by 33 votes to 22 referring back to the Committee the question of the abolition of meter rents.

Burton Call in Expert.

An important discussion on the position of the Burton-on-Trent Gas Undertaking took place at a meeting of the Town Council, when a recommendation was carried that Mr. Frank H. Jones, M.Inst.C.E., be appointed an expert to advise upon the position of the undertaking.

Councillor Giles said they hoped by calling in an expert to effect economies, and also to increase the demands for gas. An expert who was continually dealing with various undertakings would be of great assistance in helping them to solve the difficulties that confronted them. He and others held the view that there was room for both gas and electricity, and he could not conceive of anyone suggesting that they should close down the gas undertaking.

The position of the Manager would not be prejudiced by the calling-in of an expert, who would have to deal with a peculiar situation. The appointment of an expert was not, he said, a reflection on the staff of the gas undertaking.

Improved Lighting of Todmorden.

The less important parts of the main roads of Todmorden are lighted by 4-light staggered burners in 20-in. square lanterns mounted 15½ ft. to mantles. The lanterns have been raised to give this height by extension pieces. These were made on the works and are adjustable so as to be adaptable to the varying heights of existing cast-iron pillars. The 20-in. lanterns have been used so that, as the demand for more light increases, larger burners can be substituted with little trouble.

Progress was made during the past twelve months in completing some of the above work and in extending "group-lighting." A length of one mile, with 26 lamps, is controlled by one clock. Two out of every three (except at important points) are extinguished at midnight, the remainder at dawn. A group of 19 lamps in several adjoining streets is controlled by one clock, 18 lamps being put out at midnight, the main lamp at dawn. There are other groups in operation and still others being formed.

Coventry Works Dispute.

Men Resume Work.

Mr. J. Varley, Secretary of the Coventry and District Engineering Employers' Association, interviewed in regard to the dispute at the factory of Messrs. George Wilson, Ltd., gas meter manufacturers, of Coventry, stated:

"I would like to make it perfectly clear that the whole of the trouble at the above works has arisen through the Sheet Metal Workers' Union having demanded that two of the most skilled workmen of the firm should be dismissed because they were having the courage to work to the best of their ability.

"The position shortly is that the Union endeavour to fix a 'limit' of earnings and to insist that no workman shall earn more, while engaged upon piecework, than what the Union specify. The result is that because these two men have applied themselves to their jobs and have earned more than the arbitrary 'limit' of earnings laid down by the Union, they have committed a heinous offence in the eyes of the Union. Yesterday morning seventy odd men demanded of the firm that these two hard-working men should be dismissed for the reason that they were applying themselves to their jobs!

"At the same time a demand was made by the Union from these two men that they should hand over their earnings beyond the Union 'limit' for the past five weeks. This amounted in one case to 31s. and in the other case to 21s. Because the firm declined to be a party to such a demand the rest of the men 'struck' work.

"The two tinsmiths who had worked to the best of their ability were taken before the 'Star Chamber' of the Union and promises extracted from them: (1) To pay over to the Union their excess earnings. (2) To restrict for the future their output within the 'limit' laid down by the Union.

"This is a position which the employers will not tolerate, and on Dec. 11 letters were written to the Union representatives demanding a local conference to go into the whole position involved, which raises issues of a most serious character, affecting the very life blood of industry not only in Coventry but throughout the country."

The men are working as "usual."

Manchester and District Junior Gas Association.

Visit to Lancashire Tar Distillers, Ltd.

The Association visited the works of Lancashire Tar Distillers, Ltd., on Wednesday, Dec. 9. They were received by Mr. J. B. Lane, Technical Director, Mr. W. S. Thomas, Works Manager, and Mr. Charles Nicholls, Assistant Manager. The tour round the works, together with the explanatory remarks given, was much appreciated.

The works cover 6½ acres or thereabouts, and is situate on the Manchester and Liverpool Road, and stands on the banks of the Manchester Ship Canal, which, together with the Railway, gives the firm all facilities for the receiving and delivering of any commodity, and puts the firm in a splendid position for exporting their products, particularly creosote, pitch, and refined tar.

High tea, at the invitation of the Directors, was served at the Coach and Horses Hotel.

Mr. Thomas read a paper entitled "The Distillation of Crude Tar and the Recovery of the Bye-Products."

Messrs. F. Horner (Burnley), H. Goodier (Runcorn), W. E. Plevin (Blackpool), H. Partington (Bolton), and J. Albinson (Manchester) joined in the discussion of the paper.

Mr. H. Dean (Ellesmere Port) moved, and Mr. Partington (Bolton) seconded, a vote of thanks to the firm. Mr. Lane, Dr. A. F. Campbell, and Mr. Thomas replied.

Col. W. M. Carr (Stretford), the President of the Manchester District Association of Gas Engineers, was present, and spoke in a dual capacity as President and Chairman of Tar Management Committee. He said that the success of England depended upon the use made of our two most valuable minerals, coal and iron. Coal to-day was in a bad way, therefore England was also. Much money was being spent on imported petrol, which meant money going out of the country. There was now a scheme to run motor vehicles on gas and replace petrol by coal. This would bring about a new era both to the coal and the Gas Industry. In Paris 200 Metropolitan 'buses had been converted to use coal gas in place of petrol. They carried cylinders charged to a pressure of 3000 lbs. per sq. in., and which ran vehicles for 100 miles at a cost equivalent to petrol at 6d. per gallon. Moreover, the time taken to recharge the cylinder was only one minute. The weight of a sufficiently strong cylinder, while of no account on large vehicles (only representing a fraction of the total weight) was the stumbling block which prevented at present its universal application to vehicles of all sizes, as in smaller machines the cylinder represented a large proportion of the total load. However, he imagined that the task of making such a cylinder combining strength with the necessary lightness was not beyond the ingenuity of modern science of metallurgists.

EARTHQUAKE—HAWKES BAY, NEW ZEALAND

How Gas Undertakings were Affected

By ARCHIBALD DOUGALL, Director of Dougall Coombs & Co., Ltd., and formerly Engineer to the Wellington Gas Company.

One of the most disastrous earthquakes that has taken place in the British Empire occurred at 10.50 a.m. on Feb. 3 of this year in the Hawkes Bay District of New Zealand. Hawkes Bay District is situated on the East Coast of the North Island of New Zealand, facing the Pacific Ocean, about 210 miles distant from Wellington on the south and Auckland on the north. It is one of the finest districts in the Dominion, consisting as it does, for the greater part, of rich rolling agricultural land devoted to sheep-raising, dairy farming, orchards, &c. Scattered throughout are fine homesteads, the whole country-side being almost like a part of England, but with an ideal climate.

Mr. L. PICKERING,
Engineer and Manager, Napier Gas Company, Ltd.

The chief towns are the City of Napier and the town of Hastings, with a combined population of 35,000, and a large suburban population. Both are rapidly growing prosperous towns, forming the chief outlets for the produce of the district and supplying the farmers' requirements.

THE EARTHQUAKE.

Tuesday, Feb. 3, was a beautiful summer day; the streets and shops were filled with people, business was being carried on as usual in every direction. Suddenly, just before 10.50 a.m., the earthquake commenced with a swaying motion, which greatly increased in intensity until the final burst came, which appeared to rock the whole earth, the first shake lasting between 1½ and 2 minutes.

It is quite impossible to describe the conditions of affairs immediately following the earthquake. In less than two minutes everything in these prosperous towns had changed to chaos. Over 300 people had been killed, over 1000 seriously injured; shops and stores full of customers and assistants, offices, hospital, the nurses' home where the sisters and nurses on night duty were asleep, the Cathedral in which a service was being held, the Technical College, many schools full of children, practically every hotel and every chimney had crashed to the ground like houses of cards.

In many streets the fronts of the buildings on both sides had fallen out, and the débris of both was piled up right across the street. For several days the shakes continued, some of which were quite as violent as the first earthquake, some being considered even worse.

The catastrophe was so sudden and unexpected that all were stunned, and for a time could only feel thankful that they were still alive.

Immediately after the earthquake, with the earth still rocking under their feet, parties were at once formed to rescue the injured and those who were trapped in the buildings, and this work was continued for over a week. Great damage had been done to the hospitals, many fatalities occurring among both nurses and patients; a field hospital was at once formed, the doctors experiencing great difficulties owing to the loss of all medical supplies and the shortage of water.

Mr. H. C. THOMPSON,
Secretary, Napier Gas Company, Ltd.

Fires broke out in both towns, those in Hastings being confined to individual buildings, but in Napier the damage was much more serious and extensive, as it swept right through the whole business area.

GAS UNDERTAKINGS.

In Hawkes Bay the chief gas undertaking is that of the Napier Gas Company, which has works in both Napier and Hastings. Mr. L. Pickering is the General Manager and Engineer, and Mr. H. C. Thompson the Secretary.

The annual meeting of the Company was arranged to take place at 11 a.m. on the morning of Feb. 3 in the Company's Board Room, which was situated over their Town Showroom. At 10.50 a.m., when the earthquake took place, the Directors and shareholders had commenced to assemble. The first effect of the earthquake was that the front wall of the showroom building fell into the street, but fortunately all present, including the office staff, were able to make their escape into the street after many exciting experiences, before the heavier shakes came, bringing down

the remainder of the building. What was left of the offices, showroom, and workshop was completely destroyed by the fire which followed.

Mr. Pickering was on his way to attend the annual meeting of the Company, and was passing the Masonic Hotel (where the meetings of the New Zealand Gas Institute were held exactly twelve months previously) when the earthquake took place. As the building began to fall, he made for the Parade to get into the open. This was accomplished partly on his hands and knees, as during the heavy shakes it was impossible to stand up.

Typical Street Scene in Napier after the Earthquake.

The sight from the Parade was a terrible one; the buildings in the City were then crumbling in every direction, the Bluff Hills with cliffs 200 to 300 ft. high, commenced to fall into the Harbour, burying men, vehicles, and the road under thousands of tons of rock.

Damage Done to Gas-Works Plant.

The gas-works at Napier are situated on flat land on a gravel subsoil and are modern and up-to-date in every detail. The carbonizing plant consists of a bench of four beds each of four Glover-West vertical retorts, contained in a steel frame building with brick filling; at the time of the earthquake the bunkers had just been filled and contained 48 hours' supply of coal.

Owing to the serious damage done to the plant throughout the works, the only course open was to allow the charges in the retorts to burn out, which course was adopted. To add to the troubles, the coal in the overhead bunkers took fire and burnt for several days, as there was no water available, and every able-bodied man was employed in rescue work.

As soon as attention could be given to the works, the fire was got under control, and the bunkers emptied to reduce the weight on the retort bench. It was then found that the retort bench proper had stood up wonderfully well considering the enormous strain to which it was subjected.

The ironwork on the top of the retort bench was badly damaged, the girders supporting the coal bunkers were twisted into all shapes, some of the bunkers and hoppers were smashed, the foul main joints had drawn, and in some places were 6 to 9 in. apart. The outer portion of the building above the retort benches, together with the coal conveyor and hoppers, were about 3 ft. out of perpendicular. Strange to say, the 4½ in. brickwork forming the panels of the retort house was practically unharmed, two panels only in which there was some open work falling out.

Entrance to Napier Gas-Works,

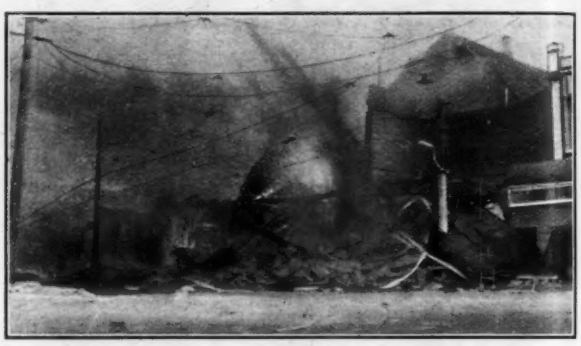
Showing the fallen boiler chimney across the roadway. Brick walls of the office have fallen out, roof supported on wood lining.

The scrubbers and purifiers were undamaged with the exception of a few broken mains. A concrete tar tank was later discovered to have cracked badly and allowed its contents to escape. A wall near a concrete tar tank built in the ground, with a hatch in the top, was found to be splashed with tar to a height of 20 ft., which is a good indication of the intensity of the shake.

Chimney Stacks.—The boiler chimney, which stood about 80 ft. high and near the entrance to the works, fell, but, fortunately, though it dropped right across the roadway, none of the staff or buildings was injured. Another chimney stack of about the same height, belonging to the old horizontal setting, also fell, but unfortunately in this case it seriously injured the foreman.

Gasholders.—A small single-lift column-guided gasholder in a steel tank above ground was practically undamaged, but the large holder, a two-lift spiral-guided holder in a steel tank above ground, was seriously damaged. About 3 ft. of water was thrown out of the tank, and it is interesting to note that in each case the surge or wave of the water appears to have filled the inlet and outlet pipes of the holder and automatically cut off the supply of gas from the district. At the time of the disaster, the two-lift holder was about half way up the second lift. The force of the water being thrown out of the tank ripped the guide rails out of the rollers, and in doing so not only badly bent the guide rails, but also buckled and tore the sheeting. In addition it was afterwards discovered that four of the tie rods of the roof trusses were broken.

The Napier Gas Company also had a small 2-lift spiral-guided gasholder situated in the town near the Inner Harbour, and used as a district holder. This was also in the second lift at the time of the earthquake, and the damage done to the guide rails was very similar to the other spiral holder, only the inner lift being fit to work. The ground around the tank of this holder was badly shaken up, resembling a ploughed field, being cut up to a depth of 4 or 5 ft. On removing the earth covering the 12 in. inlet and outlet pipes of this holder, it was found that, though before the earthquake the pipes rose from the street main to the holder tank, such movement had taken place that this was reversed, and the mains now actually fell from the street to the tank. The connections between the tank and the valves on the inlet and outlet pipes were steel, and these had been forced up against the girders under the tank to such an extent as to be distorted in shape.



Napier Gas Company's Showroom and Offices.

On second floor is to be seen the Board Room, where the Shareholders were assembling for the Annual Meeting when the Earthquake took place. Afterwards completely destroyed by fire.

Mains and Services.—From the earthquake alone, the damage done to the gas mains was enormous, but, in addition to this, falling masonry broke pipes in every direction. Service pipes were bent to all shapes, hundreds being torn out of the mains.

Hastings Works.

At the Hastings Works, the carbonizing plant consists of horizontal settings with dwarf chimneys, which were all thrown down, but the other plant was not seriously damaged, with the exception of the two-lift spiral-guided gasholder, which was injured in practically the same way as the holders at Napier, the water in this case thrown out of the tank washing the boundary fence away. In the district the mains were not so badly damaged as at Napier, though there was much breakage due to falling masonry, and the showrooms and offices were totally destroyed.

Offers of Assistance.

From what has already been stated, it will be realized that the tasks confronting the Engineer of the Napier Gas

Company in the days immediately following the earthquake must have appeared almost insurmountable. The only bright spot at that time was offers from practically every Gas-Works in New Zealand to place at his disposal the services of their Engineers, staffs, or any materials or appliances that might possibly be of assistance to him.

Reconstruction of Gas-Works and Reticulation.

After carefully considering the position, Mr. Pickering decided that he would concentrate first of all on the Hast-

Earthquake Fissures in Road.
Georges Drive, Napier, opposite the Secretary's residence.

ings Plant, as conditions there were better than at Napier. While the retort house chimneys were being re-built and repairs made to the plant in the works large gangs of men were employed in locating and repairing mains and services.

Immediately the repairs were sufficiently advanced, a start was made to supply gas again in the Hastings area, using only the inner lift of the gasholder. In the early stages there was a large amount of leakage, but since the broken mains have been discovered and repaired everything is going remarkably well. Immediately after the shake, and for some weeks, the residents who remained in the devastated area lived in tents in their gardens, cooking by means of small fires out of doors, as in nearly every case the chimneys were down. Now that gas is available, all are endeavouring to avoid rebuilding heavy chimneys, with the result that gas appliances of every description are in great demand, and the gas consumption is already in excess of the corresponding period last year.

Napier.

Immediately Hastings' gas supply was resumed, Mr. Pickering turned his attention to the Napier Works, and a start was made to put a bed of vertical retorts into working order. Heavy steel cables were attached to the gable end of the retort house. These were anchored to a solid

Masonic Hotel, Napier.
Large brick building, where the New Zealand Gas Institute Meetings were held under the Presidency of Mr. L. Pickering in February, 1930. Photograph taken after the shake and before the fire.

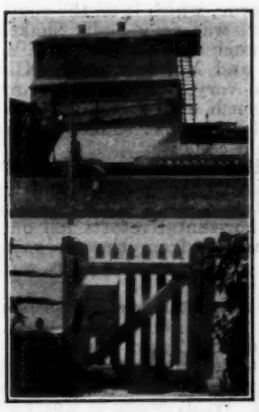
foundation some distance away, and by means of tackle and winches the whole of the building and coal bunkers were pulled back into position. The next step taken was to remove the ironwork from the top of the retort bench; repairs were then made to the brickwork where necessary, and, by selecting the least damaged fittings, sufficient were obtained to bring two beds of retorts into action.

In the meantime the Dunedin Corporation had been good enough to loan a water gas plant. This was erected in the Napier Works, and with this plant making gas and using the small single lift gasholder, a start was made to supply gas to Napier. In the meantime repairs had been effected to various portions of the plant, and extensive repairs put in hand to the two-lift gasholder. The greatest problem, however, was in connection with the mains and services. While repairs were being made in the works, a start was made to locate the broken mains. As gas was not available, in order to ascertain where the breakages had taken place a compressor was brought into use and air was forced through the mains, carbon bisulphide being used to give the air a distinctive odour. By this means a large number of leaks were detected prior to the gas supply being resumed, but after gas was turned on, it was found that only a very small proportion of the leaks had been located.

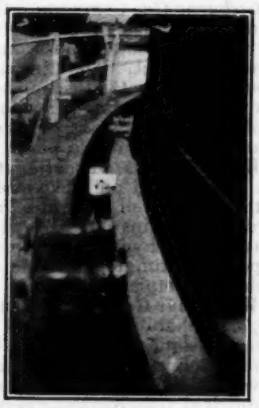
In many cases the gas mains were not only bent into every imaginable shape, but, in the case of cast-iron mains, were broken in every direction. Over 400 broken mains, varying in size from 3 to 12 in. in diameter, have already been repaired, and many other troubles have been overcome such as sagging due to the ground sinking, waterlogged mains, the water entering in every direction through the breaks, many of which were close to broken water mains. Great trouble was experienced from the silt and gravel carried by water deposited in the gas mains, often completely blocking them.

Consumers' Appliances.

Large numbers of appliances were lost in the damaged buildings, including meters. In many houses the gas cookers were torn out of position, the gas connections



Vertical Retort House, Napier Gas-Works.
Three feet out of perpendicular.



Hastings Gasholder.
Rail out of position, outer lift moved round 2 ft. 6 in.

broken, and the cooker found lying in the middle of the floor, smashed to pieces. In this connection it is interesting to note that practically every pendent electric globe and glass shade in Hawkes Bay was broken, by being swung up and smashed against the ceilings.

Gas Company Offices.

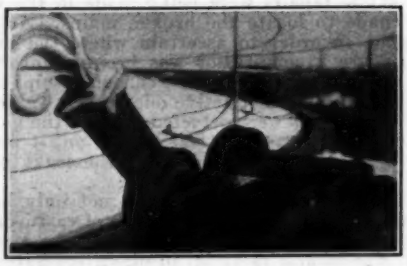
The only office or building belonging to the Napier Gas Company left standing after the earthquake and fire was the first office built at the entrance to the works. This had brick walls and was lined with wood, the brick walls all fell, leaving only the wood lining, which fortunately supported the roof. The walls of this office are now covered with galvanized iron, and the building has become again the headquarters of the Company.

The Directors of the Napier Gas Company were among the few farseeing business men who took out earthquake policies on their property. The showrooms, offices, and shops in both Napier and Hastings, which were all totally destroyed, and the gasholder at Napier, which was seriously damaged, were fortunately covered by earthquake insurance. This gasholder was probably the only one in New Zealand covered by insurance.

One particularly good piece of work was done by the Secretary of the Napier Gas Company, Mr. H. C. Thompson. Between the time of the earthquake and the fire reaching the Town Offices, Mr. Thompson went back into the shattered building, collected all the books and records of the Company, together with anything of value that could be easily moved, placed them in the strong room, and locked the door. This was the only part of the building

which remained intact, with the result that every record belonging to the Company was saved.

In this connection it will be interesting to note that some of the banks lost the whole of their records, including their customers' accounts, and the Government Lands Department lost all records, including the whole of the Land Titles for the Hawkes Bay District.



Guide Rail out of position, Napier Gasholder.

The gas supply in both Napier and Hastings is now quite normal, except for a somewhat excessive leakage in the former city, which it will take some time yet to overcome, and the gas consumption is naturally much reduced.

Messrs. Pickering and Thompson, together with their staff, are to be heartily congratulated on the wonderful work they have successfully carried through under conditions of a magnitude fortunately seldom met with by gas men in any part of the world.

Other Gas Undertakings Affected.

Gisborne Gas Company.—Gisborne, which is on the coast, about 150 miles north of Napier, was very badly shaken by the earthquake, and though much damage was done, no lives were lost. The Engineer and Manager of the Gas Company, Mr. O. Prince, had a very strenuous time for some days; his vertical retort bench and chimney rocked violently, and during several of the worst shakes it was feared that the whole plant would collapse.

Waipawa Gas Department.—Here the Manager, Mr. T. H. Talbot, had an unenviable time. The gable end of his retort house fell out into the street; the supports for the hydraulic mains on a bench of horizontal retorts fell out, leaving the hydraulic mains hanging from the ascension pipes. Fortunately no one was injured, and repairs were quickly completed.

Wanganui Gas Department.—Wanganui is a city of over 20,000 inhabitants situated on the western coast of the North Island, over 100 miles distant from Napier in a straight line. Here the earthquake shock was felt fairly severely, though no serious damage was done. At the Municipal Gas-Works, where Mr. W. J. Stone is Engineer and Manager, large volumes of water were thrown out of the gasholder tanks, flooding the works and filling the inlet and outlet pipes of the gasholder, with the result that the gas supply was cut off from the town for about an hour while the water was being pumped out of the syphons.

Lessons from the Earthquake.

Many important lessons have been learnt as the result of this earthquake, but probably the two most outstanding features in connection with gas-works are:

(1) In practically every works where the shake was severe, the gas was automatically cut off from the district by the flooding of the inlet and outlet pipes of the gasholder. As a result of this, in no case was any fire attributed to gas.

(2) Wherever the shake was severe, the guide rails of the spiral-guided gasholders locked in the rollers, with the result that the enormous force of water driven up by the waves or surge between the outer lift and the tank in each case severely damaged the gasholder; in at least two cases the hammering of the bottom curb against the tank strained the joints and loosened rivets in the tank.

4-in. Steel Main Damaged at Hastings.

Damage done to Guide Rail and Sheeting.

Hastings Gasholder being inspected by Works Manager, Mr. Baker.

There is no conclusive proof that column-guided holders of equal size would have escaped damage, but the fact still remains that all the column-guided gasholders and their tanks, which, unfortunately for the purposes of comparison, were of a small size, escaped uninjured.

IN CONTINENTAL COUNTRIES - - -

Abstract Translations from the Technical Press of France and Germany.

THE STANDARDIZATION OF BENZOLE.

According to "Journal des Usines à Gaz," 1931, 55, 557-558 (Nov. 20), the following tentative method for testing the gumming properties of benzole was put forward at the 4th International Benzole Conference at Hamburg.

The apparatus shall be entirely of glass with ground joints. The glass chosen will be either Pyrex or Jena apparatus glass. The apparatus shall be thoroughly cleaned by successive rinsing with concentrated sulphuric acid, distilled water, 5—10 p.ct. caustic soda solution and distilled water and finally dried with a stream of purified air. The vessel employed shall be a spherical flask of approximately 250 c.c. capacity. Heating shall be effected over a boiling water-bath, the level of the benzole and of the water in the bath being approximately the same. The reflux condenser shall be of an efficient type and of length 200—250 mm. The orifice of the bubbling tube shall be 2 mm. in diameter and shall extend almost to the bottom of the flask. The volume of gas bubbling through the benzole shall be controlled by means of a flow meter.

(*a*) *Determination of the gum developable on storage.*

The test is carried out on 100 c.c. of a sample previously filtered through a filter paper, the first 10 c.c. of filtrate being rejected. The gas bubbled through the benzole is oxygen, and the pressure shall be carefully maintained constant, if need be with the help of a balancing bottle between the expansion valve and the flow meter. The oxygen shall be passed at a rate of 35 c.c. per minute. The heating operation and the passage of gas shall proceed simultaneously, the duration of the test being three hours. Three-quarters of the liquid shall then be distilled off, the reflux condenser being reversed. The residue shall be evaporated in a dried tared basin of an anti-climbing type and of a capacity of 75 c.c. After the evaporation, the basin shall be dried to constant weight at 100—105° C., cooled for 15—30 minutes in a desiccator and quickly weighed on a balance sensitive to 0·25 mgm. and having a well-dried case.

The upper limit for the gum developable on storage is fixed at 10 mgm. per 100 c.c.

(*b*) *Estimation of the actual gum content.*

When the actual gum content is desired, the test shall be carried out by a simple evaporation under the same conditions.

BUILDING A GAS-WORKS

A Christmas Competition Instituted by Messrs. Newton, Chambers, & Co., Ltd.

With a view to stimulating interest in the many-sided and fascinating aspects of gas engineering, Messrs. Newton, Chambers, & Co., Ltd., of Thorncliffe Ironworks and Collieries, near Sheffield, are instituting a competition on novel lines, which they hope will prove of interest and bring home to the mechanically minded young men in the Gas Industry the scientific interest attaching to the design, construction, and operation of gas-works.

The firm are sending to engineers of gas undertakings:

(1) Particulars of the competition and prizes offered.

(2) The necessary material from which a model of a fully equipped gas-works can be built.

(3) A photograph of two views of a model built from identical materials to those mentioned above.

An accompanying letter signed by Mr. W. Newton Drew (Chairman and Managing Director of the Company) concludes: "We hope that the competition may prove of interest at Christmas time. Should more than one of your engineers desire to enter the competition, we shall be pleased to forward one other set of the necessary material on application, provided that we still have a set available."

The Competition.

The competition is to construct a model of a gas-works layout and provide an accompanying description of the layout. The competitor may be the gas engineer to whom the drawings are sent, or anyone nominated by him.

While an endeavour has been made to provide the necessary materials, the competitors can introduce any plant, buildings, or design necessary to conform to their ideas as to the best layout for a works of the size and kind suggested. Any plant or buildings introduced must be of such general construction as to harmonize with the rest of the model.

The works has necessarily to be of a rather large size, in order to allow of the economic use of mechanical appliances, and the capacity has been taken as:

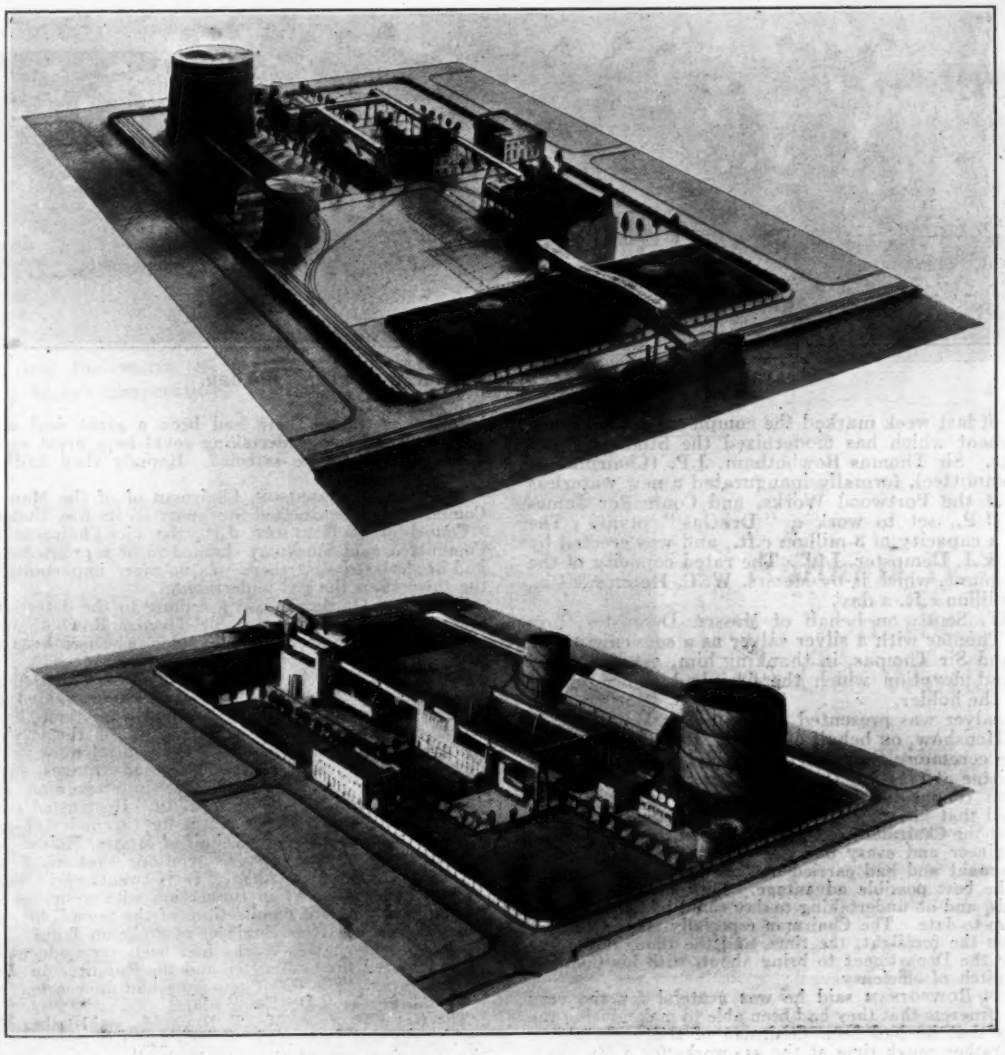
Four to five million cubic feet of coal gas per day.
Two to three million cubic feet of carburetted water gas per day.

The photograph shows two views of one possible layout which pre-supposes the existence of water-borne facilities. Competitors may, if they prefer, deal with a situation where water-borne facilities do not exist and only rail-borne coal is available.

The following prizes are offered for competition:

1st prize	£50	6th prize	£5
2nd ,,	£20	7th ,,	£5
3rd ,,	£10	8th ,,	£5
4th ,,	£10	9th ,,	£5
5th ,,	£ 5	10th ,,	£5

But the Judge reserves the right to group any or all of these prizes in cases where he considers the solutions to be of practically equal merit.



GAS-WORKS CONSTRUCTION COMPETITION—TWO VIEWS OF ONE POSSIBLE LAYOUT.

For purposes of adjudication, marks will be given as follows:

30 p.ct. for the general construction of the model.

30 p.ct. for the layout of the works to allow the most convenient and economical working.

40 p.ct. for the description of the works and the reasons for the particular apparatus and layout chosen, having regard to economical and convenient working.

Mr. George Evetts, M.Inst.C.E., M.Inst.Gas E., &c., has kindly consented to act as Judge.

CONDITIONS.

The site given is rectangular, occupying a space of 350 yards by 200 yards, which is entirely available for the buildings, plant, and roads.

Duplication of the design should be avoided in the description. That is to say, anything which is obvious in the making up of the model need not be re-described in the written work. This, of course, does not preclude giving reasons for variations of any kind.

The written description (which must be limited to ten single-sided pages of foolscap) should point out where variations are made in sizes or otherwise from the general dimensions of the model. Thus, only one holder and a relief holder have been shown, but competitors should state size and number of holders in their description, whether they vary the standard design or not.

If competitors wish, they can use the material provided, but deal with other forms of plant in their description. For instance, the retort house shown is that used for a well-known form of vertical retort, and this can be used in preparing the model, although the description of layout may be for horizontal or intermittent retorts, &c.

Models and essays should be forwarded to Messrs. Newton, Chambers, & Co. not later than Jan. 31, 1932.

STOCKPORT'S PROGRESSIVE GAS DEPARTMENT

Inauguration of Waterless Holder and "Dri-Gas" Plant

AT THE INAUGURATION OF STOCKPORT'S WATERLESS HOLDER.

Tuesday of last week marked the completion of a scheme of development which has modernized the Stockport Gas Department. Sir Thomas Rowbotham, J.P. (Chairman of the Gas Committee), formally inaugurated a new waterless gasholder at the Portwood Works, and Councillor James Hardman, J.P., set to work a "Dri-Gas" plant. The holder has a capacity of 3 million c.ft., and was erected by Messrs. R. & J. Dempster, Ltd. The rated capacity of the gas drying plant, which is by Messrs. W. C. Holmes & Co., Ltd., is 5 million c.ft. a day.

Mr. J. W. Scott, on behalf of Messrs. Dempster, presented Sir Thomas with a silver salver as a souvenir of the occasion, and Sir Thomas, in thanking him, acknowledged the skill and devotion which the firm had shown in the erection of the holder.

A silver salver was presented to Councillor Hardman by Mr. D. M. Henshaw, on behalf of Messrs. Holmes.

After the ceremony those present were the guests of the Gas Committee at tea.

The MAYOR (Councillor James Penny, J.P.), in a speech of welcome said that no one could inspect the gas-works without realizing that the Chairman, the Vice-Chairman, the Committee, and the Engineer and every one else concerned had exercised great forethought and had carried out the work of the undertaking to the best possible advantage. They had used up-to-date methods, and no undertaking to-day could be a success unless it was up-to-date. The Chairman especially should be congratulated on the foresight, the time, and the thought that he had given to the Department to bring about, with his Committee, such a pitch of efficiency.

Sir THOMAS ROWBOTHAM said he was grateful for the very satisfactory progress that they had been able to make during the eleven years that he had been Chairman of the undertaking. They had a rather rough time at the gas-works for a few years before that time. There had been a great deal of unrest in the works, and no undertaking could be a great success unless the workpeople were satisfied. Happily they had nothing of that kind to-day.

Alderman J. HARRISON, Chairman of the Manchester Gas Committee, congratulated Stockport on its Gas Undertaking.

Councillor J. HARDMAN, J.P., the Vice-Chairman of the Gas Committee, said Stockport claimed to be a progressive borough, and he declared that there was no more important industry in the town than the gas undertaking.

Councillor Hardman paid a tribute to the determination, enterprise, and leadership of Sir Thomas Rowbotham, and also thanked the Engineer, Mr. Reynolds, who had been responsible for reducing the cost of the service.

Mr. CHARLES DEMPSTER, on behalf of Messrs. Dempsters, said it was four years since his firm had investigated the advantages of the new type of holder, and since then the Gas Light and Coke Company had installed five of them, with a total storage capacity of 30 million c.ft., and all were working satisfactorily. There were many definite advantages, such as evenness of pressure and accessibility in examining every point above the piston with perfect safety. He trusted that the new plant would mean extra business for the undertaking.

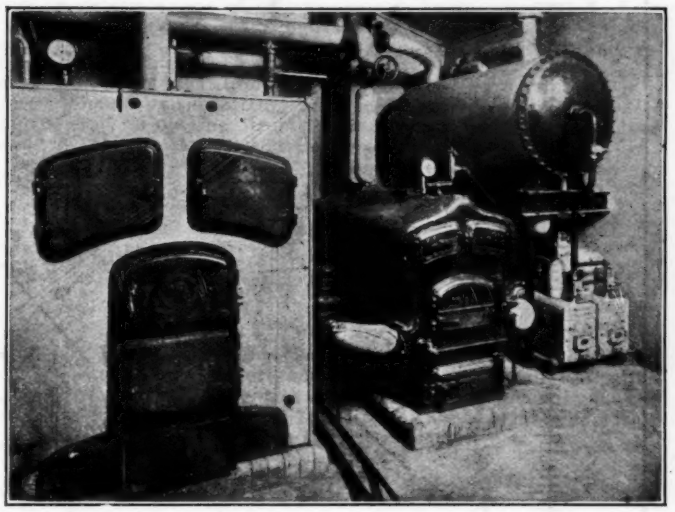
Mr. D. M. HENSHAW, on behalf of Messrs. Holmes, also spoke, and referred to the early associations that his firm had had with the Portwood Works. "It is twenty-eight years since I first visited Stockport in connection with your gas-works, and I have very pleasant recollections of the town," he added.

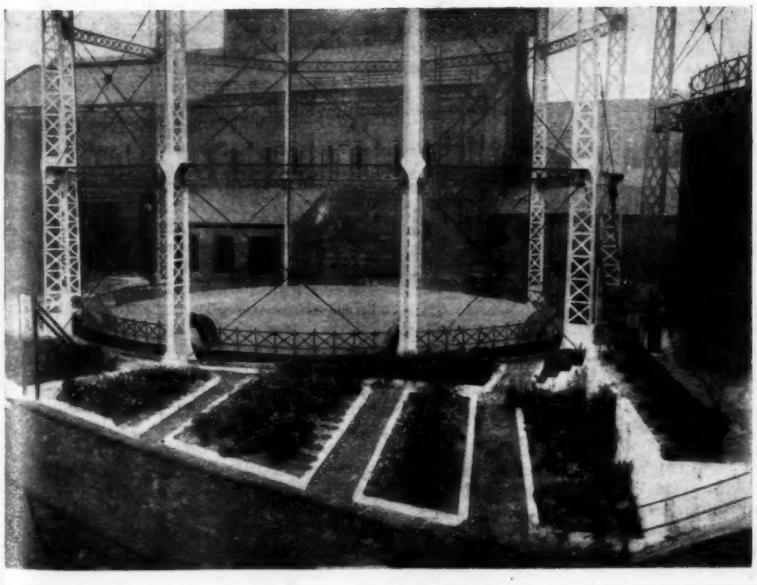
Mr. A. MACKAY, Gas Engineer of Stoke-on-Trent, said the visit to the Stockport Gas-Works had been very educational. He congratulated the Committee and the Engineer on the condition of the works. The Gas Committee had done a very wise thing in installing the "Dri-Gas" plant.

The GAS ENGINEER, Mr. T. Reynolds, paid tribute to his staff and to the Gas Committee for the assistance he had received in the carrying out of the installations.

Panel Heating for a Large Suite of Offices

The photograph on the left is of the draughtsman's office of an engineering firm in Westminster, which is heated by cast-iron panels fitted on the slant roof, assisted by vertical panels at each end, also a dado of panels the full length of one side and to a considerable length of the other. The continuous panel on one side is 95 ft. long, made up in sections approximately 9 ft. each, the intervening spaces for connections being covered with dummy sections so that the line is not broken. This is an interesting installation in which there are about 160 cast-iron " Rayrad " panels fired by the boiler plant shown in the illustration on the right. The circulations are designed upon the " two-pipe drop " principle. A good circulation is obtained by gravity action, but to enable long panels to be used (the waterway is only equal to the bore of a 1-in. pipe), and to reduce the pipe sizes, an accelerator is provided. It is, however, used only intermittently or in the most severe weather. The illustration of the boiler plant (by Thomas Potterton (Heating Engineers), Ltd.) also shows how heating and hot water supply systems can be combined even on a large scale. Where, however, the central heating boilers are so largely out of proportion to the requirements of hot water supply only, as in this case, an alternative method of producing hot water for the summer time is essential. In an office installation of this type only hand-basins have to be served, for which a moderate temperature in hot water supply is sufficient. It is therefore obtainable through the 300-gallon indirectly heated cylinder, even though the heating system is required to circulate at a comparatively low temperature. For the summer months, when the heating system is out of commission, twin " Victor " gas boilers are installed connected to heat the upper half of the storage cylinder, which is sufficient during the warm weather, as the water is at a higher temperature.

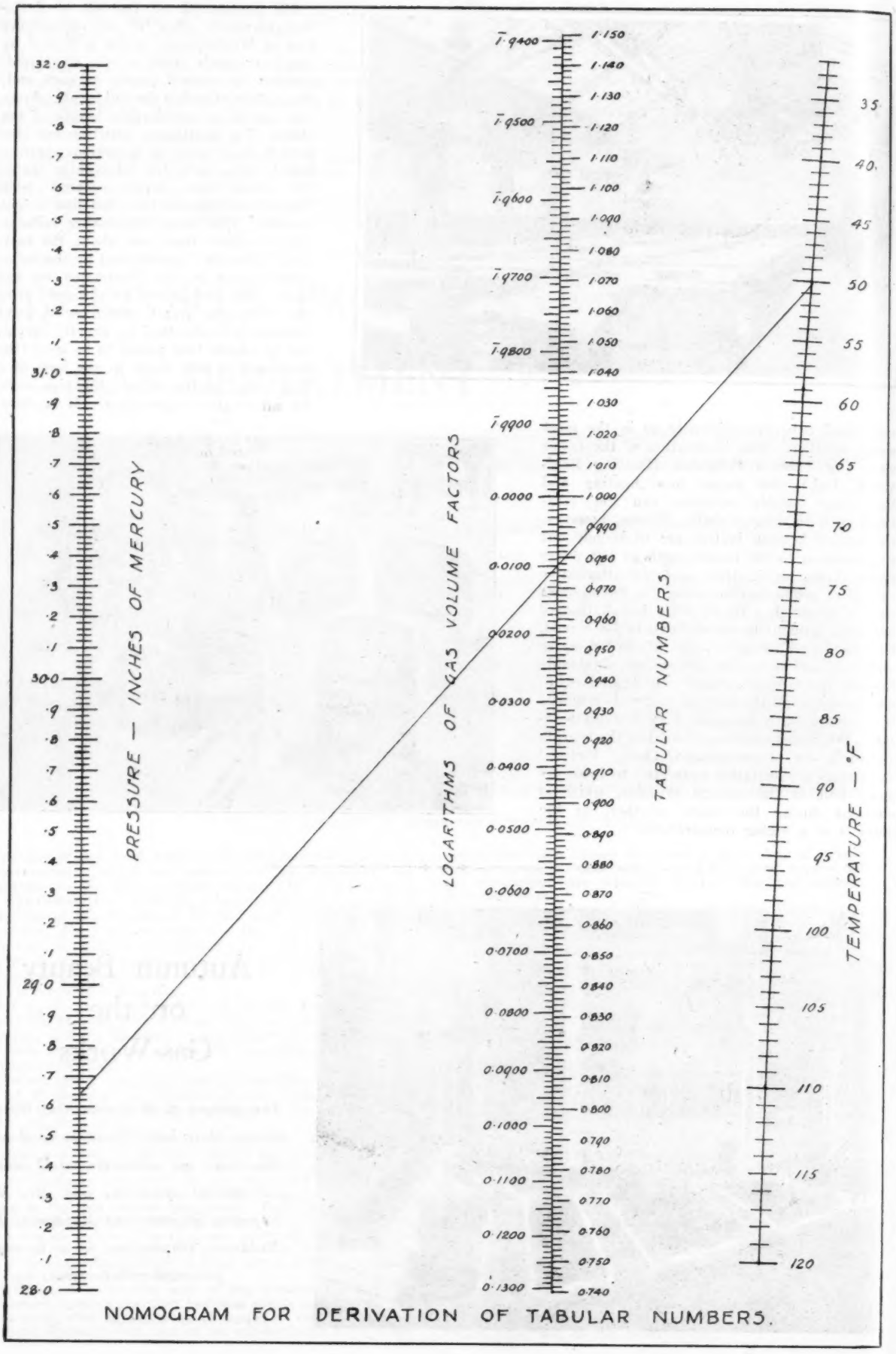




Autumn Beauty on the Gas-Works

The gardens at Middleton Gas-Works looking their best. There is no doubt that clean and attractive works make for efficient operation; and Mr. W. Rogerson, Engineer and Manager to the Middleton Corporation, is to be complimented on his scheme.

[*By courtesy of " West's Gas."*



NOMOGRAM FOR DERIVATION OF TABULAR NUMBERS.

Nomogram for Reduction of Gas Volumes to 30 in. Pressure and 60° Fahr.

By D. G. Bagg, the Gas Light and Coke Company, Fulham.

A nomogram was published at the beginning of 1930* for the reduction of gas volumes to N.T.P., using millimetres as barometric units and degrees Centigrade as temperature units. Since the English barometric unit, the inch, and the Fahrenheit temperature scale are in more frequent use in the Gas Industry, it was decided to construct a nomogram for the reduction of moist gas volumes to 30 in. pressure (saturated with water vapour) and 60° Fahr.

The equation for obtaining the "tabular number" for the reduction of gas volumes to this standard pressure and temperature (*cf.* Gas Referees' Notification) is:

$$F = \frac{17{\cdot}617\,(P - p)}{(t + 459{\cdot}4)}$$

Where F = tabular number.
t = temperature in ° Fahr.
P = barometric pressure.
p = vapour pressure of water at t° Fahr.

The nomogram will be seen to consist of three scales representing respectively the pressure, tabular number, and temperature, the tabular number scale being also graduated with the logarithms of the "gas volume factors" (the reciprocals of the tabular numbers).

The use of the nomogram depends upon the fact that a straight line joining a given pressure and temperature cuts the remaining line at a point corresponding to the tabular number for that pressure and temperature. A suitable cursor for this purpose is a strip of clear celluloid an inch or so wide with a straight line accurately cut down the centre. This can be obtained for about one shilling from a drawing instrument maker. If the cursor be laid across the chart to join the points 30 in. and 60° Fahr. (the standard conditions) the line will be found to cut the tabular number scale at 1·0000. A few examples are given below:

Pressure.	Temperature.	Tabular Number.	Log. Gas Volume Factor.
In.	° Fahr.		
30·00	60·0	1·0000	0·0000
31·22	47·5	1·0739	$\bar{1}$·9690
30·92	111·9	0·8696	0·0607
28·64	51·3	0·9748	0·0111
29·08	117·7	0·7891	0·1029

*"Journal," 1930, **189**, 256; J.S.C.I., 1930, **49**, 21T.

It will be seen that this chart has many advantages over the table of factors. It is quite as simple to read and is more accurate, since the tabular numbers as generally used are only calculated for divisions of 0·1 in. pressure and 1·0° Fahr., making a difference of 0·003 or 0·004 between two consecutive tabular numbers. Since these are only calculated to ± 0·0005, it is not possible to interpolate accurately for smaller divisions of temperature or pressure. The nomogram reproduced here is graduated to 0·02 in. pressure, 0·002 tabular number, and 1·0° Fahr., and can easily be interpolated to hundredths of an inch or tenths of a degree, the tabular number being read with ease to three decimal places. The fourth decimal place can be filled (say) to the nearest 0·0002, if required, but the gas laws do not hold to much greater accuracy.

Another great advantage of this nomogram is the wide temperature range (32° Fahr. to 120° Fahr.) which facilitates, for example, the manipulation of calculations involving gas volumes at high meter temperatures, such as those encountered in retort-house work.

In addition to giving the tabular numbers required in all manner of calculations involving gas volumes, the nomogram gives a quick and accurate method of obtaining the logarithms of the gas volume factors, as required in the determination of calorific values, by the simple expedient of having the scale calibrated on one side with the tabular numbers and on the other side with the logarithms required.

If the logarithm of the tabular number is required, it is found by subtracting the logarithm of the gas volume factor, as obtained from the nomogram, from 0·0000. If we take the examples given above we have:

Log. Gas Volume Factor.	Log. Tabular Number.
0·0000	0·0000
$\bar{1}$·9690	0·0310
0·0607	$\bar{1}$·9393
0·0111	$\bar{1}$·9889
0·1029	$\bar{1}$·8971

If the gas volume is required corrected to a dry basis instead of the wet conditions, the tabular number as obtained from the nomogram should be multiplied by 0·9827. For correction to N.T.P. (dry) the additional factor is 0·9323, and to N.T.P. (wet) is 0·9380.

REVIEWS

LIGHT SPIRITS FROM THE LOW-TEMPERATURE CARBONIZATION OF COAL.*

Technical Paper No. 34 is in the nature of a special report dealing with the fairly exhaustive investigations carried out at H.M. Fuel Research Station on the properties of the light spirits obtained in the low-temperature carbonization of coal, (*a*) by "scrubbing" the gas, and (*b*) by distilling off the lighter fractions of the tar.

The report also deals in what may perhaps be regarded as a rather too comprehensive manner with the methods evolved and adopted for the recovery and refining of these light spirits.

The total yield of crude spirits is of the order of 2-4 gallons per ton of coal, and the refining losses are shown to reduce this yield by about 15 p.ct.

It is emphasized that although considerable pains have been taken to analyze the products available for these investigations, only an approximate idea is arrived at with regard to the nature and properties of this class of materials. The composition of the light spirits varies considerably with such widely divergent factors as the type of coal carbonized, the type of retort used for the carbonization, the method of operation of the carbonizing system, even with the type and operation of the ancillary plant, and, of course, with the method of recovery and refining of the spirit. It is thus with rather mixed feelings that one reads, "The composition of the finest spirit collected must always be the result of a compromise between these different treatments, and will vary if any change is made in the method of operation of the retort . . . also with the type of coal carbonized."

There are, however, several parts of the report which prove extremely useful whether the results recorded are those of fresh investigations or confirmation of results previously recorded.

It is shown that with a particular coal, by keeping the method of carbonizing and other conditions constant, but varying the carbonizing temperature from 450° to 700° C. (in increments of 50°), the percentage of aromatic hydrocarbons in the light spirit increases rapidly, while the unsaturated hydrocarbons show a definite decrease. Particularly noteworthy is the degree of change of the constituents on passing from 550° to 600° C., a significant fact in view of the large proportion of low-temperature systems operated at about this temperature, where slight fluctuations may thus cause considerable variations in the composition of the spirit.

A series of five coals of widely differing coking properties carbonized under identical conditions at 625° C. gave total yields of spirits varying from 2·6 to 3·7 gallons per ton, while the composition of the spirit varied over a much wider range. The highest yield and the best quality of spirit was apparently obtained from Mitchell Main coal. The main conclusion is, however, that no obvious connection can at present be established between the yield and composition of the spirits and the nature of the coal. There is a general tendency for the percentage of aromatic hydro-

* Department of Scientific and Industrial Research. Fuel Research Technical Paper No. 34. H.M. Stationery Office, London, 1931. Pp. VI. + 26; price, 6d. net.

carbons in the total spirit to increase as the carbon/hydrogen ratio of the coal increases.

The study of the effect of the refining processes on the composition of the spirit shows that the main result is a definite reduction in the content of unsaturated hydrocarbons, the other constituents being scarcely affected.

A very interesting and useful contribution is the result of a study of the solubility or miscibility of the spirits in alcohol. The most important observation in this connection is in regard to the effect of aqueous dilution of the alcohol; a reduction in the concentration of the alcohol from 95 p.ct. to 90 p.ct. decreases the solubility of the spirits from 50 p.ct. to 15 p.ct. at 0° C. This large effect of dilution, which is always possible owing to accidental addition of water as well as to the inherent hygroscopicity of alcohol, is one of the difficulties associated with the utilization of alcohol blends. Here again it may be observed that spirits from different coals and different retorting systems vary in their solubilities in alcohol, variations of from 50 p.ct. to 71 p.ct. being recorded for the spirits from two different coals.

It may here be pointed out that in this section of the report (p. 15) occurs a contradiction; it is stated that "The solubility of the gas spirit is slightly *less* than that of the tar spirit . . .;" the converse is shown in Table 8 immediately preceding this statement. As there is no further indication in the text as to which of these is correct, it would be as well if an *erratum* were issued as soon as possible.

The succeeding part of the paper reports the results of a comprehensive investigation, by direct comparison with B.P. No. 1 petrol, of the suitability of these low-temperature spirits as fuels for internal combustion engines.

The conclusions from these tests are distinctly in favour of these spirits, but it is questionable to what extent these conclusions, as well as that in the "prefatory note"—viz., "a blend of these spirits . . . forms an excellent motor spirit"—are justified in view of the showings of the last section of the paper, dealing with the behaviour of the spirits, on storage, in which it is shown that deterioration in performance definitely ensues on storage, and that these spirits are very prone to ever-increasing gum formation to an extent well above the motor spirit specification limit.

"TAMBT."

ON THE ELECTRICAL SIDE

Report of the Commissioners.

As was to be expected, trade depression has affected electricity-supply to a varying extent in different parts of the country. In their report for the year ended March 31 last, the Electricity Commissioners state that the undertakings affected to the greatest extent in this way were those in the regional areas of North-East England and Central Scotland, where there was a substantial falling off in the number of units generated. On the other hand, the operations of the undertakers in the remaining seven regional areas and in North Scotland showed a substantial increase in output. Of this increase, well over 50 p.ct. was accounted for by the undertakers in the area of the regional scheme for South-East England. This is a fact which seems to have some significance at a time when so much is heard of rural electrification. However, as the falling off in the first-named districts amounted to 138 million units, while the gain in the remainder of Great Britain was about 683 million units, the Commissioners are able to record a net increase in output for the year of 545 million units, or upwards of 5 p.ct. on the output in the previous twelve months.

Inclusive of the Central Electricity Board, and allowing for the case of two companies with undertakings in England and also in Scotland, the number of separate undertakers at March 31 was 665, a net decrease of three on the number holding supply powers at the end of the preceding year. There were also four other statutory bodies not possessing powers to supply but charged with definite duties of an advisory or supervisory character in respect of the organization for the supply of electricity in districts within their jurisdiction. The 559 stations included in the returns generated 12,332,949,844 units during the year ended Dec. 31, 1930. The units generated by these 559 stations showed an increase of upwards of 3·1 p.ct. on the figures for 1929, the larger output being accompanied by a decrease of over 1·4 p.ct. on the amount of coal and coke consumed. There was also a falling-off by 555 tons in the amount of oil fuel used at generating stations as compared with the previous year. The report shows that there has been an all-round increase of the order of 7·6 p.ct. in the amount of electricity produced for each ton of coal and coke consumed for that purpose as compared with the position in 1920-21. On the basis of the estimated total population of Great Britain at the end of 1930—namely, about 44,700,000—the sales of electricity from public sources of supply in that year represented an average consumption of 202 units per head of population.

On the Selling Side.

The electrical industry is having impressed upon it the vital need for thoroughly well equipped demonstrators. Mr. A. C. Cramb (Director of the Electrical Development Association), judging from remarks he made at a meeting organized by the Electrical Association for Women, is of opinion that they can hardly know too much. He emphasized the importance of conveying to electricity undertakers a realization of the value of women demonstrators, not only for cooking, but also for home laundry and other applications of electricity. Many of the supply undertakings in the country, he said, did not believe in showrooms, and some did not believe in employing selling staffs, because they held that electricity sold itself, and therefore the number of openings for women demonstrators on the supply side was not very great at the moment. Demonstrators should have qualified in domestic science—cooking, washing, and so on—and in addition they must qualify as saleswomen, and must have a reasonable electrical knowledge. So that quite a lot was asked of them. One wondered how they could get such training on the remuneration offered them. One must feel, with Mr. Cramb, that women with knowledge indicated will be helpful to the industry, and should be paid accordingly.

A Grid Failure.

There has been trouble in the North, as is evident from an article in the "Daily Record and Mail" dated Dec. 3. The opening lines of this article read:

"'Will the grid let us down again?' is the question being asked in many quarters after the breakdown in the electricity supply this week, which affected many towns in the West of Scotland. The 'Daily Record' has good reason to believe that, given the same fog conditions, there may easily be a repetition of the trouble. An official of the Central Electricity Board explained that the breakdown was due to the fog bringing down from the atmosphere multitudes of tiny particles of soot and charred paper which, being damp, formed a coating over the insulators. This created a conducting surface which allowed the current to leak. Rain or snow, or even clean fog, the 'Daily Record' was informed were not expected to cause trouble, but dirty fog might." So now the consumers know what to expect.

The First Motor Car Exported?

So completely has the motor car conquered the civilized world, that one is apt to forget its comparative youth. In a recent issue, the "Electrician" gives an account, taken from a paper read at the annual dinner of the Circle of Nineteenth Century Motorists, of what it says "was doubtless the first order for a motor car to reach this country." Mr. Magnus Volk, the reader of the paper, is still widely known through his association with Volk's Electric Railway at Brighton, but more than forty years ago (in 1887) he earned fame by making an electric motor car, which he drove on the parade at Brighton. This achievement came to the knowledge of Sultan Abdul Hamid, who sent an order for a similar one to be despatched to Constantinople. This was done, and Mr. Volk himself visited Constantinople, and gave a demonstration of the car before the Sultan, who expressed his approval. A second car was afterwards ordered by the Sultan, and duly sent out to him.

Unseasonable.

On Monday of this week, the "Evening Standard" reported an unfortunate occurrence in these terms: The electricity supply at the L.N.E.R. station at Leyton, E., failed early to-day, and the booking clerks had to work by candle light. A station official said: "This is the worst day it could have happened. Thousands use weekly seasons, which are issued on Mondays."

NEW SHOWROOMS AT STOCKPORT

Official Opening Ceremony

GROUND FLOOR OF THE NEW SHOWROOMS.

On Dec. 7 Sir Thomas Rowbotham, J.P. (Chairman of the Gas Committee), formally inaugurated new showrooms of the Stockport Gas Department. The premises are situated in St. Petersgate, occupying one of the most valuable sites in this thoroughfare.

The building, of modern design, is of steel frame construction, fireproof floors, formed of hollow blocks, and reinforced concrete beams, the outside walls being built of multi-coloured brick and stone, with a black granite base below the shop fronts, giving a most pleasing appearance. The ground floor and basement form the Gas Showrooms, the remaining three floors being used by H.M. Office of Works.

On the ground floor are exhibited the latest types of domestic gas appliances. Light oak panelling with wood block floor to match forms a most suitable background for the exhibits. Industrial gas appliances exhibited for sale in the basement are also used for demonstration purposes during lectures. The floor is covered with red asphalt, having a black border, and the walls are panelled in wood.

The Architects are Messrs. Halliday & Agate, of Manchester, and the work carried out by Messrs. Hibbert & Penn, Ltd., of Stockport.

Sir Thomas Rowbotham, who was presented with a silver knife in the form of a dagger by the architect, Mr. J. T. Halliday, cut the ribbon holding the handles of the doors, and the members of the Council, officials, and visitors entered the showrooms.

Sir Thomas said it was a matter of special pride to him to open the showrooms, because the event brought to a head an ambition of his which he had been pursuing for a number of years and for which he had had to fight hard. The showrooms hitherto had been in Portwood, too far away from the centre of the town, and he had for long seen the desirability of having showrooms where people who were passing and repassing could see the exhibits.

They intended to make the showrooms one of educational value, where the ladies could learn the use of the most up-to-date gas apparatus. It was with feelings of very great delight that he witnessed the fulfilment of that scheme.

NOTES ON PLANT AND PROCESSES

"Ideal Classic" Warming.

An attractive little booklet has been issued by the National Radiator Company, Ltd., of Hull, giving the latest particulars of the "Ideal Cookanheat" apparatus manufactured by the firm, and illustrating this in the coloured enamel finishes recently introduced.

"Ideal Classic" warming, it is stated in another booklet sent us, enables the desirable conditions of warmth and comfort to be enjoyed in the average home at less expense than is entailed by the maintenance of two or three open fires, the cost per room being only about 2d. per day. The temperature may be kept uniform, or varied to suit individual requirements or changing weather conditions. There are no fumes, soot, smoke, or ashes in the rooms—just pleasing, healthful hot water radiator warmth, allowing ample ventilation without draught. Another advantage of the system is that the hot water service can usually be combined from the same boiler, thus saving the expense of installing and maintaining a separate apparatus for this purpose.

A number of the firm's boilers in attractive coloured enamel finishes are illustrated, while a centre spread in the booklet shows the method of installing the system combined with hot water supply. The piping is of small diameter, and is run beneath floors and in corners to render it inconspicuous.

The Company now supply radiators in a number of attractive colours, while they are also the makers of the flat wall radiators and "Ideal" towel rails. "Ideal Classic" radiators are made up of sections according to the amount of heating surface required. The sections are assembled together by threaded tapered nipples, making perfectly watertight joints yet permitting the free flow of water from one to the other. To each radiator a valve is usually fitted, the simple turning of which controls the flow of water and so enables the temperature to be varied at will. By this means, also, any radiator can be temporarily shut off when desired.

The booklet also explains the principle of domestic hot water supply by means of the indirect cylinder, a cut view of which is illustrated. The inner heater is connected with the radiator system, and imparts heat to the water in the cylinder, fed from the cold supply tank. This method prevents the deposit of lime in the boiler and discoloration when used in soft water districts. "Ideal" cylinders are made of copper or galvanized steel.

THE "JOURNAL" TECHNICAL RECORD

Which contains Reports of Meetings of Gas and Allied Associations

The Principles of Calculation of Low-Temperature Radiant Heating

By Mr. A. H. BARKER, B.A., B.Sc., Wh.Sc., M.Inst.C.E., M.I.Mech.E.

[The Author's Foreword to a Paper before the Institution of Heating and Ventilating Engineers, Dec. 2]

This paper suggests a method of calculation of rooms heated by low-temperature radiation which appears to be more in conformity with scientific principles than the rule-of-thumb methods hitherto generally adopted. One of its principal objects is to provoke discussion and obtain the criticisms of heating engineers on its practicability and utility.

Nobody who has used any method of radiant heating can fail to appreciate that the "effective" emission expected from a radiant panel is greater than the actual emission obtained by test, and to ask himself how this can be. Why, if we only find under test an emission of 750 B.Th.U. per hour from one "Rayrad" section, for instance, are we entitled to calculate that the "effective emission" is 1100 B.Th.U. per hour, or 50 p.ct. greater. It is that anomaly which the present paper endeavours to explain.

It points out in the first place that there is an essential difference between the mode of operation of a radiant surface and a convective one. The radiant calculation is made with reference to the heat emitted by the body of a person in a room, while the convective calculation is made of the amount of heat lost from a room when maintained in a certain condition of temperature, without any reference to the body in the room.

The radiant principle was originally suggested on account of the strong conviction of the author that the radiant is a more important factor in the maintenance of heat comfort than is the air temperature.

The essential difference between warming by convection and by radiation is that in the former we raise the air temperature and allow the radiant to take care of itself while with radiant heating we control the radiant temperature and air temperature separately as far as that can be done.

The paper gives an outline of the fundamental principles governing the emission and absorption of radiation, which were described in the first Bulletin issued by the Institution from the Laboratories of University College, London, at the time when the author was in charge of them. It explains that the amount of heat lost by radiation from a human body maintained at a certain temperature depends on the mean radiant temperature, which expression is described. It may roughly be pictured as the mean temperature of the walls.

It describes in some detail how the variation in the temperature of the room surfaces affects the loss of heat by radiation from the body, and how the value of that loss is calculated. It outlines also the approximate method of calculating the amount of heat loss by convection, and describes the interaction of the radiant and air temperature conditions.

PRIMARY CALCULATION.

The primary calculation is based on figures given on the authority of German Physiologist, Rubner, that the normal loss of heat from a human body is by convection 138 and by radiation 195 B.Th.U. per hour. It is assumed that the surface of the human body is at a mean temperature of 75° and for purposes of radiation may be taken to be 15 sq. ft. superficial area, and for convection 21 sq. ft., the difference being due to the fact that while convection proceeds freely from all parts of the body a good deal of radiation from some parts is suppressed or trapped by other parts just as most of the radiation from the columns of a radiator is absorbed by other columns and does not emerge into the room.

It is then shown that for this dummy body, having 15 sq. ft. of radiating and 21 sq. ft. of convecting surface, various conditions of radiant and air temperature may be laid down which will procure from such a body a total heat loss of 333 B.Th.U. per hour, as laid down by Rubner. According to the current theory the conditions of heat comfort in a room are that this should be the amount of the total heat loss, and that it is more or less unimportant how that loss is sub-divided between radiation and convection.

It is pointed out that every kind of radiating surface emits an amount of convective heat, and figures are given to enable the amount of primary convection and primary radiation from each to be calculated.

A detailed description is then given of the proposed method of calculation, which is directed to the determination of the area and temperature of hot surface which must be introduced into a room having assumed wall surface temperatures, in order to produce appropriate rise in the value of the radiant temperature. The convection effect is controlled by regulating the air temperature, and for this purpose it is necessary to know how much of the heat emitted by the radiant element is in convective form.

A drawing of a typical schoolroom is given, and this rational method of calculation is applied to it, and compared with the empirical figures which practical men have adopted. It is shown that this method of calculation must itself necessarily be to some extent empirical, because the true scientific facts are so immeasurably complicated that they could not possibly be used in practical calculations.

If the principles laid down are scientifically sound, the adjustment of the coefficients must necessarily be left to practical experience to determine. In particular, the absorption of the heat by the walls of a room is an affair of such complication that it can only be estimated in practice by a comparatively rough approximate method, which is nevertheless believed to be near enough to the truth for practical purposes.

This principle is extended to the important cases of warming spaces in the open air, in which it is obviously impossible to raise substantially the air temperature, and examples are given of installations which have been carried out in this way in practice. The same principle is applicable to the warming of the occupied spaces in large buildings, such as churches, or cathedrals, which it is practically impossible to warm uniformly by any convective method.

This leads to a discussion of a suggested graphical method of determining the mean radiant temperature at any point in a room heated in a miscellaneous manner by hot surfaces scattered about the room.

It must be emphasized that though the author has reason to believe that the tables and figures given are not far from those which will ultimately be found to be correct for practical purposes, yet they are not laid down as being definite or final in the ordinary sense of a scientific text book. Before they can be so established they will have to undergo the scrutiny of experience and application to a large number of practical cases. As far as the author has had the opportunity of testing them, in his own installations, they are in very fair agreement with practice.

The latter part of the paper makes suggestions as to the kind of research needed to establish the principle of radiant heating on a sure foundation.

Scottish Junior Gas Association (Western District)

On Saturday, Nov. 21, the Scottish Junior Gas Association, Western District, visited the Edinburgh Works of Messrs. Thomas Glover & Co., Ltd., gas meter manufacturers. These works have been specially designed to meet the requirements of a branch meter manufacturing establishment, from which source all meters required for their Scottish trade are manufactured.

The works consist of a meter shop, including an assembly department, and sections for dealing with brass work, leather diaphragms, and testing. There is also an Edinburgh Testing Station in the works where the official stamp is fixed. Besides these are the paint shop, stores and despatch departments, with commodious offices for administration.

Mr. A. W. Sharman, the Chief Chemist from London, followed the visit with a lecture on the "Making of a Dry Gas Meter." This proved of great interest to the members, as all the points outlined were illustrated by means of a film which gave close details of the process of construction of a meter, together with films showing an aerial view of the London works and machines actually producing the parts necessary for the assembly.

The members were interested in the various gas flashing signs demonstrated under actual working conditions, also in the latest product of this concern—the dual-coin meter. Simplicity is the keynote of design, and although a simple adjustment converts the meter from a penny to a shilling, all the weaknesses in design of old prepayment mechanisms have been eliminated.

THE MAKING OF DRY GAS METERS.

By A. W. Sharman, of Messrs. Thomas Glover & Co., Ltd.

It will no doubt be a surprise to many of you to know that 286 separate pieces go together to make up what we call a No. 2 prepayment meter. Some of these parts are duplicated on both sides of the meter, but all of them have to be assembled after having been made in one of the shops that keep the actual assembly shop going.

Almost every mechanical means of shaping metals is used to produce meter parts. The tinned plate that forms the meter case is cut into required sizes by guillotines, pressed in stamping machines and presses, and appears on the tinsmith's benches correct in all dimensions, as it must be, to fit in its allotted place in the meter. Subsidiary to this department is a large machine shop where new press-tools are designed and made, to suit alterations in size and form, and the heavy wear and tear on the existing tools is corrected. All thicknesses of sheet brass from $\frac{1}{8}$ in. downwards are also cut out, bent, and pierced on similar presses and stamping machines. Stuffing-boxes, spindles, and all such round brass parts are made on lathes in a special department. Some of the lathes are automatic and work at high speeds with a continuous flow of oil covering the tools. There is an endless changing of tools working on the length of brass rod until it is used up, and so many dozen or hundred of the unit are dropped in the container below.

A foundry is another important part of the meter maker's works, supplying the white metal, brass, and other non-ferrous alloys used in meter construction. Then come the smaller sub-assembly shops making assembled units, a leather department where the skins are cut to the size of the many diaphragms used, saturated with leather lubricant, and allowed to settle for a period before fitting. Painting and dispatching require a large area when hundreds of meters are dealt with a week.

To understand thoroughly the use of meters it will be of great assistance to get an inside knowledge of the construction. There is not the time available to consider all the details of manufacture, so we will content ourselves with the assembling of the components as supplied to the meter maker at the bench.

The work is divided broadly into two sections, case-making and finishing. The meter is started from the bottom, where two white metal studs are fixed to act as bearings for the ends of the motion rods. The bottom is now fitted in a jig to the sides, and soldered. The bottom half of the meter is divided vertically into two halves by the partition which is now put into position. The next component fitted by the tinsmith is the valve-plate. This divides the bottom or measuring compartments from the top portion, which contains the recording mechanism. This valve-plate is supplied after being made up in another department. The valve gratings have been soldered into position, and channels for taking the gas to the different compartments have been fixed. It is as well to note at this stage that these dividing plates have to form gas-tight compartments. To gain this end, the method of soldering adopted is to tack the part in position and then carefully sweat the seam from end to end and reduce the chances of an internal leak occurring, to an absolute minimum. The side pipes, complete with boss, are now put in position covering the inlet and outlet gas ways in the sides.

Attention is now concentrated on the two measuring chambers at the bottom of the meter. To support the edge of the diaphragm, a metal rim is soldered to each side of the partition, and a gas way connected to the inner grating port. It is now necessary to support the centre of the leather disc which forms the diaphragm, and to transfer the motion, as it moves backward and forward, to the recording mechanism in the top of the meter. This calls for a small sub-assembly made by the tinsmith. Having set the two stuffing boxes or glands in place in the valve-plate, he sweats what is termed a flag to the rod, attaches a small white metal roller bearing to the flag, and solders the bearing supports to a large tin-plate disc. The rod on which this assembly is mounted is set with one end in the stud at the bottom of the meter, and the other passing through the stuffing box in the valve-plate, to take the top arms. Both bottom compartments are fitted in this manner.

The Leather Tier.

At this stage the tinsmith passes his partly constructed case over to a leather tier. This man brings an oiled disc of leather and a covered metal band with some fat and washers, and proceeds to bolt the leather to the loose disc at the centre. The edge of the leather is laid round the rim and drawn up tight by means of the metal band, which is fitted with a nut and bolt for that purpose. This is an operation that calls for a certain amount of practice and dexterity before the necessary caution can be acquired. The leather is carefully smoothed into position to avoid creases or puckers. In all places where the leather is brought into close contact with metal, some sort of covering is provided to prevent subsequent chemical action between the tanning chemicals and the iron. After fitting diaphragms to both sides, a preliminary sounding test is made. The diaphragm must move in a straight path, and as evenly as possible, so a bent wire is fixed in small guides to effect this end. All moving parts are then greased, and the interior work in the bottom part of the meter is completed. The galleries that enclose the top part, and the back and front, which enclose the bottom part, are soldered on to the sides and valve-plate.

The meter is now beginning to assume the shape it is popularly known by. This is the start of what is known as finishing. First comes the fixing of four small guides for the valve covers. Made of soft white metal alloy, their function is to keep the cover moving across the valve grating in a straight line. Then comes the crank for moving the valves, with the connecting arms attached. These are dropped on to pins on the top of the valve. Grinding the surfaces of both the cover and the grating is done before the parts are issued to the assembly shop.

The valves are housed in a separate compartment on the valve-plate, and the first step in enclosing them is now accomplished. This is to erect an angled bridge across the top of the meter from gallery to gallery. The crank is set vertical by means of a small stuffing-box in a plate, which is soldered to the top of this bridge. The box is stuffed with a pad of wool saturated with oil and fat, and the lid screwed down to make a gas-tight bearing between the valve chamber and the top of the meter. The revolutions of this crank count the quantity of gas, and have to be transmitted to the index and also, in the case of a prepayment meter, to the movement. To this end, a worm is slipped on the crank shaft standing above the bridge and sweated in position. On the plate is also mounted a loose pawl called a back-stop, and the bearings for the ends of the spindles which actuate the index and the prepayment mechanism. The index is now fitted, the wheel on the spindle geared to the worm, and the dial set square in the rectangular space cut in the front gallery. Over this space is soldered a frame holding the glass.

Attention now returns to the meter top, and a short threaded arm fitted with a movable pin is sweated to the end of the crank. This is termed the tangent. The pin is connected to both motion rods by means of linked arms called top arms. With the diaphragm fully extended, these arms are sweated to the rods in such a position that they just clear the galleries. The other end of the small link arm is put on the pin temporarily, to be secured later, when adjustment is finished, with a split pin. The meter is now ready for valve setting. It will have been understood from the construction that there are four measuring compartments in the bottom of the meter. These compartments are filled and emptied, the quantity of gas being controlled by the movement of the valves. As the meter is made they are approximately correctly timed, but a finer adjustment

is required to give the necessary accuracy. This is done by altering the length of the valve arm by various means, according to the method decided on. Whatever means are used, the valve covers must be made to open to each port in the grating at the exact time for delivering gas to or from that particular compartment.

It is now time to check the work that has been done on the meter. A tiny pinhole or leak in any of the measuring chambers will spoil this exact quantity that it is expected to yield. This is tested by an operation called sounding. The meter is filled with gas, and all round the external seams a light is passed. As the pressure used is in the region of 20 in., and long experience has made these men adept in the art of spotting small flames, there is practically no chance of a faulty seam passing this stage. Then the inside compartments are tested for leaks. This is done by removing the covers and filling each in turn with gas. A light is applied to the opposite port of that grating, and the gas slowly burns away. A gas leak from one side of the diaphragm to the other will cause the light to continue to burn, being fed by the leak from the gas at pressure. An air leak causes a white tip to appear on the flame at the port. The port to the chamber under test is of course stopped off during the trial. This again is a matter for experience and use, as waving naked lights round gas meters full of gas is a pastime only for experts. An error on somebody's part may leave one *partially* full of gas.

During all these tests the valves have been exposed for handling. They are now finally cleaned up with a flat buff, and enclosed in their chamber by the fitting of the back plate. This adjoins the small plate on the bridge, and is soldered to the galleries and the outlet side. The last adjustment has now to be made before the meter top is put on. This is termed registering by the makers, and is the means of making one complete revolution of the crank deliver the specified quantity of gas from the meter. Each diaphragm has its motions in turn transmitted to the crank by means of the top arms and the tangent arm. The point of connection to the tangent arm is movable, and by taking this point closer or further from the crank, the amount of diaphragm travel can be varied. In this manner the amount of gas displaced by them is made more or less during a revolution. The meter is connected to a test holder, and allowed to run for a complete and exact revolution of the tangent. The amount of gas or air, as the case may be, is read off on the holder scale. This should agree with the meter capacity, which is decided on originally when the meter is designed. If more volume shows on the holder than equals the capacity of the meter, the length of travel of the diaphragms must be shortened. The pin on the tangent is accordingly moved towards the crank shaft, or *vice versa* when required. This adjustment finished leaves the meter as a correct volume measuring instrument within the limits laid down by the Board of Trade. The pin is soldered in position, the top is put on, the various badges are fixed if not already in their place, and a seal ring is set to cover the edge of the top and index. The meter is ready for painting and the official stamp.

Prepayment Mechanism.

As we are dealing with modern methods of production I will explain how a modern prepayment movement is fixed. The whole attachment is supplied to the meter maker as a sub-assembly from one of the subsidiary departments. It consists of a platform on which is mounted a rectangular box containing the valve which shuts off the gas by closing on a seating. On top of the box is mounted a steel frame which forms the bearings for the screwed spindle, worms, and wheels that actuate the opening and closing of the valve. A vertical rod to which is attached the round button-shaped valve by means of a brass arm, passes through a stuffing box set in the box. To the end of this rod is fixed a quadrant wheel geared to the rack, moving on the screwed spindle. The movement of this rack is also carried by a long lever to a circular dial in the front of the attachment. This dial denotes the unconsumed gas paid for. Beneath the platform is a tin-plate housing for the coin box, and to the front is the drum holding the coin wheel, price changer, and pocket. The coin motion is transmitted to the movement by a fixed spindle passing through the back of the drum. The top part of the attachment is enclosed by a hinged cover secured when the coin box is in position.

The attachment complete is fitted to the inlet side of the meter. A special side is found on meters intended for prepayment mechanism, there being no side pipe, as this is fixed to the valve box. A stuffing box allows the prepayment spindle to pass through the side, the other end being geared to the crank worm. This special side also has a long tin plate shot near the bottom, two screwed brass eyelets near the top, and a screwed flange where the inlet to the meter is. To fix the attachment, a strip on the bottom is slid into the slot on the side, the top is fixed by two screws through holes to the eyelets, and finally the valve seating, with which is incorporated a hexagon nut, is put through a large hole in the side of the valve box and screwed on to the flange with a washer and white lead, forming a gas-tight joint. The valve is tested for soundness when shut off and for quick opening, the necessary adjustments made, and a disc soldered over the hole. This disc can be removed at a later date for inspection of the valve or for removal of the attachment. A prepayment meter now goes to a man with a wonderful variety of coins, who deliberately tries to make the valve open with small coins, and then endeavours to make the right coin stick up in the pocket after its full travel has been reached. These ends not achieved, he probably sighs, removes his coins from the box, sets the price changer to the Company's set and the pointer at zero, and passes the meter into stock.

How the Meter Works.

You have now, I hope, a good outline of what is inside a dry gas meter and how it is put together. The next thing to ascertain is how it works. In an ordinary meter the gas is led from the inlet pipe along the bottom of the valve-plate and passes through a hole in the valve-plate into the valve chamber. Here it has access to the ports of the grating which are uncovered by the covers. There are four ports which are uncovered in turn. The two nearest the galleries are connected to the outside of the two diaphragms, and the two nearest the partition to the inside.

As far as actual measuring units, the two compartments act independently. We will assume that the front valve cover is just opening its outside port. This means that underneath the cover the inside port is just going to be connected to the middle or outlet port. The gas in the valve chamber now has access to the outside of the diaphragm in the front compartment, and will exert a pressure on it, causing it to move towards the partition, expelling, as it moves, the gas from the inside up through the inside port and away under the cover to the outlet pipe, which is connected to the middle port. As the leather moves inwards, the rod to which it is hinged turns and moves the arm at the top of the meter. This is connected to the tangent arm by a link, and tends to revolve the crank, which in turn draws the covers across the gratings. Both covers work off the same crank, making one a quarter of a cycle behind the other. When the front cover is on its dead centre, the back inside port is open, and the back diaphragm half filled. This movement takes the front cover to a position in which the outside port is open. By this means the gas moves the diaphragms, and these revolve the crank through the top arms, the crank draws the covers over the gratings in turn, and allows the gas to pass in and out to complete the cycle.

Every revolution of the crank has caused four times the volume of one movement of the diaphragm to be pushed out of the meter. For the sake of illustration this can be taken as 2 c.ft. The drum hand on the smaller meters registers 2 c.ft. per revolution, obtained by a ten-toothed wheel being meshed in the worm on the crank, the wheel being fixed rigidly to the index spindle. When the worm on the crank has revolved ten times 2 c.ft. of gas has passed through the meter. This has caused one complete revolution of the index wheel, taking with it the pointer on the dial which has indicated the 2 c.ft. The rest of the pointers are moved by gear wheels at the back of the index.

Now comes the question of the inner working of the prepayment mechanism. The theory of the majority of modern coin meters is briefly this. A leather faced shut-off valve is set in the inlet path of the gas. This valve is controlled by some sort of threaded carrier moving along a screwed spindle. It is moved by hand power at the knob of the meter in one direction, and by a spindle, turned by the meter as it works, in the reverse direction. The movement of the knob is transmitted to the screwed spindle by means of a large toothed wheel and the coin, held in a pocket behind the large adjustable plate known as the price changer. Old meters used to have the coin itself engage in the teeth of the wheel, but it is usual now to employ a spring blade in the pocket, which is moved into engagement with the teeth when the coin is inserted. The spindle from the meter is geared by worm and wheel to draw the carrier back along the movement spindle, and from the gearing of this volume of gas is determined. We will assume that one complete revolution of the coin wheel moves the carrier $\frac{1}{2}$ in. along, and we want this to allow the meter to pass 50 c.ft. Taking the meter capacity as before, a ten-toothed wheel geared to the crank worm on the P.P. spindle, itself turning a worm geared to a twenty-five-toothed wheel attached to the carrier, will close the valve after the 50 c.ft. have passed. A stop in the drum limits the travel of the pocket, and the adjustment of the travel of the coin wheel before the coin is discharged is made by serrations on the edge of the price changer.

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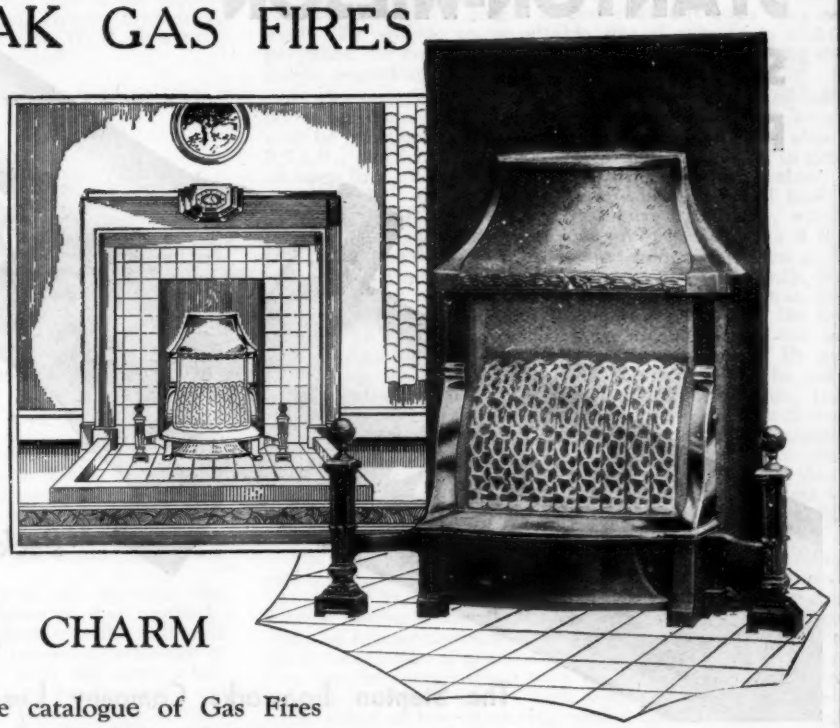

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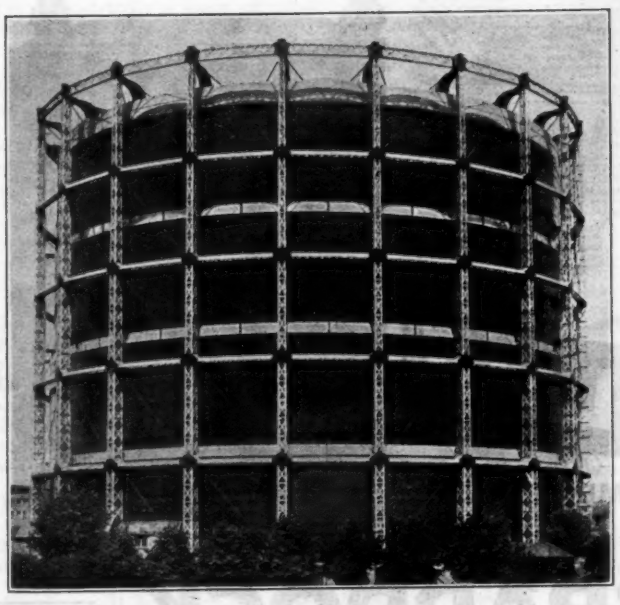

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Institute of Fuel

A Meeting of the Institute of Fuel was held in the Rooms of the Chemical Society at Burlington House, Piccadilly, London, W. 1, on Wednesday, Dec. 9. Dr. W. R. ORMANDY (Fellow, and Member of Council) presided.

THE COMMERCIAL EVALUATION OF COKE.

By R. A. MOTT, M.Sc., F.I.C.

[Extract.]

The market for foundry coke is a limited one and requires only about 600,000 tons per annum for inland use. The requirements can be simply stated:

Moisture.—The moisture should be low because of its carbon-diluting effect.

Ash.—The ash should be less than 8 p.ct.

Sulphur.—The sulphur should be less than 1·0 p.ct. and preferably less than 0·8 p.ct.

Hardness.—The coke should have a 1½ in. shatter index of over 90.

Cokes which meet these specifications for sulphur and hardness are usually made from South Wales or Durham coals, and will meet such other requirements as the ability to produce a high combustion temperature. This factor cannot be specified, since it requires a difficult test for its assessment, but it is operative in the reputation which different foundry cokes possess.

The foundry coke users are distributed all over the country, and are generally conservative in their outlook. It is for this reason that Durham beehive coke will still bring a premium price for foundry purposes, although it has been shown that, when made from the same coal, "patent" oven coke is as effective as beehive coke for foundry purposes (Northern Coke Research Committee Report, 1926, 29, Newcastle-upon-Tyne). The same authority showed that coke graded 2 to 3 in. size was as satisfactory as ungraded (32 p.ct. over 4 in.) coke.

In Durham, beehive foundry coke is valued 5s. to 10s. higher than "patent" oven foundry coke per ton. In South Wales, foundry coke is valued 7s. to 10s. a ton more than furnace coke, while "special foundry coke" is at least 5s. a ton still higher in price.

There is undoubtedly a basis of quality underlying most of the reputations of good foundry cokes, for which users are prepared to pay a high price. When a cupola is giving trouble the use of certain brands of first quality foundry coke will almost certainly restore it to normal working. A sliding scale basis of payment is probably not suitable, but the competition among producers for a comparatively small trade will ensure that good quality is the basis of the price charged, although the bonuses for specially good quality are higher than for coke used for all other purposes.

COKE FOR OTHER INDUSTRIAL PURPOSES.

Crucible Steel Melting.—The beehive coke-oven industry for the manufacture of metallurgical coke apparently originated in Sheffield to make coke from small coal for the use of the crucible steel industry. Records are available which show that as early as 1805 beehive ovens were built at Sheffield for this purpose. The crucible steel industry is now only a small one, but beehive coke is still used, the coke made from the same coal in "patent" ovens being less satisfactory. It has been clearly established that the preference for Yorkshire beehive coke is not founded on prejudice, but is based on the fact that such coke breaks up readily without wastage to the most suitable size for packing into a relatively small furnace, gives a higher temperature of combustion under given conditions, and requires less attention for clinker removal. Yorkshire beehive coke is valued at 10s. to 15s. per ton more than "patent" oven coke for this purpose, the increased value being again based on quality.

Lime-Burning.—It has been established that a hard coke is preferable for lime-burning, no doubt for the same reasons as in blast-furnace practice. High fixed-carbon contents, while not being essential, are desirable. The control of quality among large users is, therefore, based on evaluation of moisture, ash, and shatter index.

COKE FOR "DOMESTIC" PURPOSES.

"Domestic purposes" is a general term which includes such uses as steam boilers, "domestic" boilers, central-heating boilers, smiths' hearths, domestic grates, and many others. For all these uses "hardness" *per se* is of no significance, but size is generally the predominant factor. According to the size of the hearth, unbroken coke, cobbles or doubles, single or pea coke nut sizes may be used. To provide an unsuitable size of coke is to create prejudice, for but little general knowledge exists among the public regarding the significance of size.

As an example of this significance the case of a small coke boiler for domestic hot-water supply in the writer's house may be mentioned. This has a fuel capacity of only about 0·5 c.ft., and has front doors which may be opened to give an open fire. When charged with a mixture of "walnut" and "apple" size of oven coke the boiler worked badly, went out several times daily, and gave a dull fire, which would have been of little value as an open fire, even if the front doors could have been opened sufficiently. On picking out the apple-size coke and using walnut-size only, the boiler worked so successfully that, once lit, it was unnecessary to close the front doors during the day, the fire picking up quickly on recharging without using the increased draught which could have been obtained. By adjusting the damper, the ratio of combustion of the coke could be controlled to give a sufficiently bright fire, this adjustment being necessary because more than sufficient hot water for the domestic requirements was available. Double, single, and pea size nuts from oven coke have been used, the singles being most satisfactory, the doubles tending to settle down too slowly and require longer time to "pick up" after re-charging, while the peas tended to fall through the grate bars.

The significance of reactivity has been unduly emphasized. It has been shown by the Midland Coke Research Committee that the specific reactivities of cokes under conditions similar to blast-furnace practice (that is, deep fuel bed and temperatures of 1600° to 1800° C.), varies but little, while those cokes of good blast-furnace value generally have low specific reactivities (rates of reaction with either air or carbon dioxide at the high temperature used). Moreover, cokes of low reactivity tended to give higher maximum temperatures of combustion than reactive cokes, this being contrary to the theoretical expectation. The influence of size on reactivity was, however, found to be very great, and small differences in size for a particular coke from (say, ½ to 1½ in. in maximum size) gave greater variation in reactivity than was obtained with over 100 "cokes" of the same size and ranging from wood charcoal to natural graphite.

It is probable that this influence of size is of similar significance when coke is burnt at lower rates than in the blast furnace. If a more reactive material is desired, a smaller size of the same coke would probably be satisfactory.

Reactivity has been considered to be of importance in the ignition of coke and in its maintenance alight in a small volume when banked overnight. There is no doubt that the lower specific reactivity of cokes compared with coal does make it more difficult to ignite, and the use of a gas burner is desirable. If the size of the coke is suitable, there is no difficulty in keeping even the smallest coke boilers alight all night. It has been stated that gas coke is more suitable than oven coke for small coke boilers, because its greater reactivity enables it to keep a "heart of fire" when damped down overnight. The writer has found that with a presumably reactive oven coke made from compressed coal it is possible to keep a fire alight all night in the small boiler, the secret being the use of a small graded size of coke. With both single (1¼ to ¾ in.) and pea (¾ to ½ in.) nuts the fire can be kept alight all night, whereas with the use of a gas coke of walnut size, success is uncertain.

These examples are only mentioned to show the significance of size. The importance of having the coke small enough is reflected in the prices which are charged. Usually the smaller the graded size of coke, the more expensive it is, in which respect coke differs notably from coal. The increased price is due, of course, to the fact that coke has to be broken to give small sizes and it is relatively more expensive to produce smaller than larger sizes, and greater wastage (breeze) results.

It is to be regretted that the smaller sizes of coke usually contain more moisture (and sometimes more ash) than the larger sizes. Thus it happens that the highest price is charged for the material of lowest calorific value.

Although coke sellers have been able to obtain higher prices for the smaller coke grades of low calorific value, it is desirable that steps be taken to ensure that the quality of the smaller grades is improved. This could be done either by drying the cokes, by the use of dry quenching, or even by the use of improved wet quenching methods.

The coke industry is not likely to be an exception to the fact that a basis of quality is usually the foundation of improved business.

The reduction of the moisture content of coke would ensure greater economy for the user and would remove the unpleasant crackling noise caused by wet coke when freshly charged. Since the use of coke in domestic boilers, which must not only supply hot water but also provide an open fire, is one of the largest potential markets of coke makers, the significance of ash should not be overlooked. In a closed boiler, ash, though undesirable, is not very harmful, but in an open fire boiler, accumulations of ash reduce the brightness of the fire. If the production of coke of (say) 5 p.ct. ash could be made more general, its sale would be very greatly simplified. If the blast-furnace coke users encourage the production of low-ash coke, the low-ash oven coke will become available for domestic use. The Gas Industry will have to take similar steps and pay bonuses for clean gas coal if it wishes to be able to produce low-ash gas coke.

Both gas and oven coke have been used successfully in the new coke grates which give an open fire. Oven coke is more difficult to ignite than gas coke, but once alight very pleasing fires are produced. Milner, Dyde, and Hodsman* have shown that radiant efficiency can be related, for cokes of similar ash content and reactivity, to the relative volume (reciprocal of relative density). Irrespective of ash content or bulk density, it was shown that the radiant efficiency was inversely proportional to the reactivity. These results suggest that both gas and oven cokes are more efficient for open-fire use than low temperature coke. Gas coke would have an advantage over oven coke because of its greater relative volume, but this might be compensated by the lower reactivity of oven coke.

The sellers of both types of high-temperature coke could no doubt learn from the experience in selling low-temperature coke. It has been said that there is no "inferiority complex" associated with low-temperature coke, and the sale of this fuel at relatively high prices has undoubtedly given an indication that a demand for smokeless fuel can be created and a relatively high price charged. The demonstration of the use of high temperature coke in open fireplaces in public buildings could with advantage be developed. There is little doubt that suitable publicity is desirable to enable the "inferiority complex" associated with high-temperature coke to be overcome and to demonstrate that gas coke (too often regarded as dirty cinders) and its little known companion (oven coke) can be used efficiently as smokeless fuels.

Coke for Export Purposes.

During the period for which statistics are available oven coke has had a higher declared value f.o.b. than gas coke, until recent years, as follows:

Declared Value Shillings per Ton (f.o.b.).

—	Oven Coke.	Gas Coke.
1921	47·9	41·4
1922	29·4	28·2
1923	46·5	32·6
1924	32·4	35·0
1925	24·0	21·7
1927	22·8	20·9
1928	19·6	20·8
1929	20·9	20·8
1930	20·2	20·9
1931 (9 months' average)	18·1	20·2

Thus gas coke has had a higher value than oven coke for three out of the last four years. In the Scandinavian market the coke is sold by volume (in hectares), and a lighter coke, such as gas coke, is proportionately more valuable even for the same f.o.b. price per ton. Attention is now being given in this country to the production of oven coke which will meet this requirement of low bulk density.

Sweden, Italy, and Spain import oven coke chiefly. Foundry coke for export trade must be specially hard to withstand the loading into ships' holds. For this reason Welsh coke has a deservedly high reputation for export purposes.

This review of the production and use of coke shows that its commercial evaluation, while being influenced by quality to a certain extent, has tended to be influenced unduly by supply and demand. When the demand has risen, the quality has suffered. In branches of the coke trade in which quality has been the main basis of price, considerable bonuses have been gained for better quality. It is, therefore, concluded that if a basis of quality were given the importance it deserves, and the manufacture of coke to higher standards were encouraged, both coke producer and user would benefit. If the largest single user of coke—namely, the iron maker—does not specify what is meant by coke, the considerable development of the iron trade which may be anticipated within the next ten years may be expected to cause an increase in the consumption per ton of pig and the disturbance of his prices which would be particularly undesirable in the severe competition likely to be met in that period. If, however, he specifies what is meant by coke, and encourages the production of better coke by bonus clauses, both he and the coke producer will benefit.

* Jour. Soc. Chem. Ind., 1931, 50, 1137.

Discussion.

Mr. E. G. Stewart (Gas Light and Coke Company), commenting on a statement in the paper concerning domestic coke, that "it is regretted that the smaller sizes of coke usually contain more moisture (and sometimes more ash) than the larger sizes," said that in domestic coke it was the smaller sizes that mattered; and he pointed out that for some years the enlightened gas companies had been very careful to produce those small sizes by cutting large coke, and not by using the screenings from the general run of coke. If screenings were used, the moisture and ash contents of the small sizes would be higher than those of the bulk, and he had an idea that quite a lot of the oven coke which came on to the market for domestic purposes was simply screened. Practically the whole of the small gas coke in the London area was produced by cutting large coke, however, and he failed to see how its moisture and ash contents could differ from the moisture and ash contents of the coke from which it was made; as a matter of fact, the small coke which was made by cutting large coke had moisture and ash contents equally as low as the moisture and ash contents of the large coke from which it was made. His Company used the bulk of the small sizes (screened) on the works, and the material they could not use in this way was very carefully washed and dried before sale. The author's statement as to the price being higher because it was relatively more expensive to produce small sizes than larger sizes, and that greater wastage (breeze) resulted was correct, but to say that the smaller sizes contained more moisture (and sometimes more ash) than the larger sizes would give consumers a wrong impression. Mr. Stewart suggested also that rather too much stress had been laid upon the question of moisture and ash *per se*. While all were agreed that the moisture content should be low, it was possible, on the other hand, to have too low a moisture content; complaints did arise from buyers if the coke were so dry as to become dusty. In America it had been the practice—but he did not think it had been the practice in this country—to treat the coke with calcium chloride solution, because objections had been made concerning the dust raised when the coke was delivered. With regard to ash, he said that in the case of coke used in closed boilers, ash itself was not a disadvantage, provided it was not excessive. In the evaluation of coke, a point of greater importance than the percentage of ash was its melting-point.

Commenting on the author's remark that the demonstration of the use of high-temperature coke in open fireplaces in public buildings could with advantage be developed, he said that gas companies had coke fireplaces in their showrooms.

Mr. Mott said he had guessed that Mr. Stewart was a seller of gas coke.

Mr. Stewart: And oven coke.

Mr. Mott said he did not think one would get from a user of coke an expression of the opinion that too much stress had been laid upon the question of moisture and ash content; he was not sure that Mr. Stewart had not given himself away by making that suggestion, and that some of his other remarks had not constituted an attempt to justify the high ash and moisture contents that were actually found in coke. It had been suggested that the reference to smaller sizes of coke containing more moisture, and sometimes more ash, than the larger sizes might have related to oven coke. Certainly he had noticed that in regard to oven coke, but he would be surprised if gas coke were exempt from it, because the average size of oven coke was greater than that of gas coke from the retorts, and any differential effect would be less in oven coke than in gas coke. However, he had not much experience of gas coke, and he hoped that the position Mr. Stewart had mentioned was more general than he had thought. Mr. Stewart had stated, however, that the coke was washed and dried before selling.

The Chairman and Mr. Stewart pointed out that that statement referred to screened coke.

Mr. Mott, commenting on the statement that buyers complained if the coke delivered to them were too dusty, said that that statement must refer to gas coke or to a soft coke of some sort. In any case, however, it could probably be treated by the method to which Mr. Stewart had referred.

Mr. Stewart pointed out that at the coke oven works in America it was found necessary to use calcium chloride on coke for the domestic market.

Need for a Coke Organization.

Dr. G. W. Anderson (Fellow) said that statistics showed that oven coke production had increased in ten years by about a million tons, and domestic uses had practically absorbed this million tons. The figures for gas coke were not given. He recalled that when the Area Gas Supply Committee had sat, two years ago, it had obtained the impression from those who had reported to it that the oven coke producers were attempting to increase their domestic market. The question had arisen—but was never settled—as to who was to be replaced, the coal merchant or the gas-works. If the gas-works, which were essentially

providers of fuel and light, in the form of gas, liquid fuel, or coke, were to be ousted from their domestic market, it would be regrettable. On the other hand, it would be all to the good, of course, to replace domestic coal by coke. This brought Dr. Anderson to the vital problem of setting up some kind of organization in this country whereby coke producers would agree as to prices, quality, and disposal. There was already in being some agreement between the Greater London Gas Companies, and he suggested that the organization be extended not merely to cover a county, but to cover the whole of the United Kingdom. It had been stated quite recently that foreign coke producers would not negotiate with British coke producers because the latter had no organization. They might have negotiated with the Mines Department of the Board of Trade—but, after all, that was a Government Department, and might not be responsible for the actions of various coke-producing organizations. Such an organization as he had referred to might very well act in two ways—it could regulate disposal and prices, and could also set up standards, such as Mr. Mott had advocated. From time to time the suggestion had come from coke users that there should be some agreed specification for blast furnace coke, or industrial coke, but he believed that Mr. Mott, in his paper, had made the first attempt to produce a comprehensive specification. The time had come for some responsible body to set up such a specification, to be used at least at home, if not internationally. It should also be extended to cover other spheres of consumption; he had in mind particularly boilers, because there the difficult question arose as to whether the fuel should be charged for on the net or the gross calorific value.

As to the domestic coke market, he again claimed that it belonged rightly to the gas undertakings. He felt that Mr. Mott had written the paper with a slight bias towards furnace coke. There was an essential difference between the two types of coke so far as manufacture was concerned, and that might account to a certain extent for some of the other differences between those cokes. Oven coke was made from ground coal, and, therefore, the ash was distributed uniformly throughout coke, irrespective of size. Gas coal, however, might be crushed to 2 in. or less, and it so happened that the shale present in the original coal was found in the sizes of coke between $\frac{3}{4}$ in. and $1\frac{1}{4}$ in. That fact had induced the progressive gas undertakings to discard the smaller coke from that which was marketed, and use it in the producers, or to extract the shale by wet or dry separation. Dry separation was probably the better process; it could be done at a cost of 2s. or 2s. 6d. per ton, whereas if the original small coke were discarded and if the small coke for the market were produced by cutting, the cost would be probably 5s. per ton.

Coke in the Open Firegrate.

Experiments had been carried out by burning, in the domestic grate, cokes with varying percentages of moisture, and it had been found that the coke containing 2 p.ct. of moisture was the most reactive. Up to 5 p.ct. very little disadvantage resulted from the moisture, so that he believed it could safely be said that with a coke containing from 2 to 5 p.ct. moisture everybody would be happy; there would be no dust. It was questionable whether a coke containing more than 5 p.ct. moisture should be sold. Dry cooling had not been so favourable as might have been expected; apart from the question of cost, Continental experience had shown that there was no advantage in having the coke absolutely dry, and he believed that moisture was added sometimes at a later stage, for various reasons.

Sizing of coke was a most important factor, but sizing could be overdone. In this connection he mentioned an occasion on which a very closely graded coke was produced on a large scale at a particular works. The grading was so close that half-inch coke was half-inch coke; no more and no less. The result was that the bulk density of the coke, and the air spaces also, decreased to such an extent that the average boiler would not hold sufficient of the fuel to carry on from one time of firing to the next. The ideal, therefore, was a combination of sizes within a certain range—and this range had been fixed very well by the London Coke Committee.

Screening Not Sufficient.

Mr. G. M. Gill (Member) endorsed Mr. Stewart's remarks with regard to the practice of the gas companies in connection with the production of small coke for sale. He appreciated that for some years before the war a number of gas companies had thought it sufficient simply to screen the breeze, which contained small coke, and to offer it to the public in graded sizes; but that practice was most unsatisfactory. As Dr. Anderson and Mr. Stewart had pointed out, the dirt in the coal—the shale and suchlike—concentrated in the small sizes. There were very unsatisfactory results with the sales, and it had become imperative, if they were to give satisfaction, to cut the coke and then screen it, and in that way the gas companies had built up a fine domestic coke trade. That could not have been done by simply screening. He was glad Mr. Mott had emphasized that the domestic coke sale problem depended on proper sizing for different uses. This was absolutely essential, and if the gas companies tried to sell wrong sizes they would cause dissatisfaction.

Discussing moisture in coke, he said he had had occasion to go to Holland to investigate dry coke cooling. No moisture was present at all, and that coke was a thorough nuisance. Wherever it was stored there was dust blowing about, and in the particular works with which he had been concerned there seemed to be a layer of about half-an-inch of very thin dry coke dust everywhere, and it became almost unmanageable. One could not help feeling that a little moisture was a great advantage from the point of view of handling the coke and giving satisfaction to the buyers.

Mr. E. W. L. Nicol (Fellow, and a Member of Council) confessed that he was disappointed in the paper because there was no clue whatever to the relative commercial values of coke and coal for steam raising and domestic purposes. Any comparison, he said, must have regard to the standard fuel of the country, which was coal. The evaporative value of gas coke in ordinary boiler practice was 10 lbs. of water per lb. of coke from and at 212° Fahr. Its radiation efficiency in domestic use was considerably higher than that of coal; that had been pointed out by the highest authorities. If Mr. Mott could give corresponding figures in respect of furnace coke they would be very helpful. As to the selling of coke on the calorific basis that had been done in London for several years, and he had never known a single case in which the sellers had been penalized. The calorific value, however, in his opinion, was no complete criterion, as a basis of comparison with coal, as suggested by Dr. Anderson. The basis of comparison for industrial use was the net evaporative value; there was no corresponding definite basis for domestic use, and much depended on the design of the grate in which the coke was used. The ignition difficulty in regard to gas coke had been entirely eliminated by the provision of the gas fire lighter, either in the portable form or attached to the grate. Complete ignition was accomplished in the open grate in the course of 15 or 20 minutes, and in the case of the coke boiler it was accomplished in 6 minutes. Corresponding figures for furnace coke would be very interesting in that connection; they would give some clue to the comparative commercial values of the two fuels.

The average quantity of furnace coke sold for domestic use over a period of three years had been given in the paper, but he suggested that it would be helpful if the author could indicate the quantity sold for domestic purposes at present. He suggested that the title of the paper should have been "The Commercial Evaluation of *Furnace* Coke." Finally, Mr. Nicol referred to a leaflet which had been distributed very widely by coal merchants in East Anglia relating to furnace coke. It offered "200,000 B.Th.U. for 1d." That had appeared to him to be a very attractive offer, and when he had worked it out he had found that the price at which the coke would be sold was 12s. 3d. per ton. That appeared to be an unusually low price, and he suggested that the offer to the public was rather misleading. It was interesting, however, as indicating one point of view as to the commercial value of a furnace coke.

The Chairman associated himself with Dr. Anderson's remarks concerning the retention of the domestic coke market by the gas companies. It would be criminal if we allowed what perhaps might be called the comparatively inefficient coke ovens—inefficient in respect of the fact that the bulk of them could not utilize their gas to the best advantage—to flood the market with household coke to the detriment of the gas-works. The gas-works were a necessity, and gas was a necessity, and the gas-works had to sell their coke in order to be able to sell their gas at a reasonable price, and there was nothing more desirable than co-operation between manufacturers of coke of all types. A lack of co-operation was the subject of one of the complaints on the Continent. Recently he had spent a week with the Managing Director of one of the great steelworks there, and had asked why arrangements were not made with the British steel makers to stop dumping. The Managing Director had asked how they could do that under existing conditions, there being a thousand steel makers in this country having no association. His country could send three or four representatives who could speak for the whole industry there, but they would have to meet hundreds of people in this country.

With regard to the moistening of coke, if they had to moisten it, why use calcium chloride? Mr. Mott would possibly agree that they might moisten the coke with sodium carbonate and make it more reactive; it would be almost as good from the point of view of preventing dust. With regard to sizing, he would have thought that the fact that there was increased bulk resulting from close sizing would have been advantageous for household purposes.

Dr. Anderson said that with close sizing there was a decrease in bulk density.

The Chairman said that meant that the coke would lie like cannon balls and there would be minimum packing instead of maximum packing. He would have thought that that would have been an advantage from the point of view of its use in the household grate, because one of the difficulties of coke burning was the necessity for keeping innumerable clear passages open for the air to pass through, and if they were stopped up by ash or by smaller divided coke, the fire would become dead comparatively rapidly. It was true that a moment's poking would make the fire bright again, however.

The Author's Reply.

Mr. Mott, commenting upon the remarks made concerning antagonism between the producers of oven coke and gas coke, and the suggestions that a scheme should be formulated for working together, and that there should be an organization to arrange the sale of coke and specifications, said he did not think this antagonism between the producers need arise. The potential market for coke was so big that it was much more than the gas coke producers could possibly meet. No doubt the position in London was rather unusual in that 25 p.ct. of the total gas coke sales of the country was in London, but he had been rather surprised that apparently it had been so difficult to sell gas coke in London where the price of the competing fuel—*i.e.*, house coal—was so high relatively. He did not think the claim that gas coke producers could look upon the domestic market as their

own could be justified. In his view the domestic coke market could be extended so very greatly that gas coke and oven coke together could be regarded as the smokeless fuel, the use of which in the newer types of coke grates should develop very considerably, and the two together could make a considerable contribution towards the reduction of the smoke nuisance.

Probably a little moisture in coke, to overcome the dust nuisance, was a good feature; what one objected to, of course, were the great excesses of moisture which had been present in coke delivered to domestic users. The sizing of coke was different, of course, according to whether oven coke or gas coke was used. Close sizing was probably of more importance in oven coke when used for domestic purposes than it was in the case of gas coke, which was somewhat more reactive. He had used gas coke and oven coke in a small domestic boiler and had found that the close sizing of oven coke was very desirable, but that he could get the same performance with gas coke in which there was much less vigorous control of size. He did not think the Chairman was quite right in his remarks concerning the importance of close sizing, because slight differences in the sizes of coke was an important factor. A great point about the use of coke for domestic purposes was that it must fall properly in the boiler or other apparatus in which it was used, and some slight difference in the sizes of the coke made it pack a little better and fall more regularly than it would do if it were all of one particular size. This factor was particularly important in connection with the use of coke in open fires, where, in the absence of hot gases from convection, carrying heat from one part to the other as in the coal fire, one had to use a deeper bed of coke, and the regular falling of the pieces to cover the voids which occurred was most important.

Mr. E. W. L. NICOL, referring to the disposal of coke dust, said that the cutting of coke gave rise to considerable quantities of coke breeze, the amount exceeding 12 p.ct. in normal practice. The calorific value of that coke breeze was considerably less than that of the coke from which it was made, so that the process of cutting and sizing coke improved its quality and its calorific value. The price at which the breeze could be sold was considerably less than that of the coke, so that there was every justification for charging a higher price for the smaller sizes than for the larger sizes. The introduction of the sandwich system of firing the coke breeze in electric power stations in London by the London Coke Committee, in 1918, had been the means of disposing of more than a million tons of coke breeze since that time, and Mr. Nicol added that he would be glad to furnish further information in this connection to those who required it.

On the motion of the CHAIRMAN a hearty vote of thanks was accorded to Mr. Mott for his paper, and the meeting closed.

GAS FIRING OF POTTERY

An article from a recent issue of the Stoke-on-Trent "Evening Sentinel" which describes what the Gas Department of the Stoke-on-Trent Corporation, under the direction of the Engineer and Manager, Mr. A. Mackay, is doing, and has already achieved, in gas firing for the pottery industry

It is one of the claims of the Gas Industry that gas can play a big part in increasing efficiency and reducing costs. Stoke-on-Trent has recently introduced a lower scale of charges for industrial use of gas, and local manufacturers have already shown their appreciation.

Experimental work has been going forward for some time in the task of utilizing gas for the firing of pottery, and a good deal has already been achieved.

The next step, which is already in its initial stages, is the setting up of a complete experimental department at the Etruria works. Adjoining the works, and owned by the Corporation, are the premises of an engineering firm who recently removed their concern.

Among the buildings is a large machine shop, with ample floor space and height, and there a concrete floor has been laid. The installation of the experimental gas ovens will proceed immediately.

It is intended to throw them open to the use of pottery manufacturers for experimental purposes. Moreover, there will be a technical staff of experts at the disposal of manufacturers for advice and assistance.

There are problems—most of them very slight—to be solved, but far more progress has been made in the adaptation of gas to the industry than the great majority of manufacturers realize. The work has long passed the theoretical stage and has now entered the realm of practical politics. The proof lies in the following summary of what has been already achieved.

A SUCCESSFUL EXPERIMENT.

The first big industrial work attempted in Stoke-on-Trent was the firing of electrical porcelain. After considerable effort including the working out of a new "rate of fire" to suit the new conditions, and certain modifications in furnace design, a successful firing process was evolved which gave complete satisfaction to the manufacturer.

It was found that the time of firing was very much reduced by gas; in fact, it was possible to receive an order for ware on Monday, make it, and pack it by Wednesday of the same week.

Attention was next given to the firing of tiles. Here further improvements were made in furnace construction, and the lessons learned from porcelain firing were of much assistance. The furnace constructed for this work had a working space of 10 ft. by 4 ft. by 4 ft., and held approximately 80 sq. yards of fancy glazed tiles.

Manufacturers will be interested to learn that it has been possible with this furnace to fire six "burns" per week. In other words, the furnace may be placed, fired, and drawn in 24 hours.

It will be appreciated what a speeding-up effect this has on a factory. Very often, the capacity of a factory is regulated by the throughput of the ovens. Both biscuit and glost have been fired in this furnace.

FEATURES OF FURNACES.

The next big order obtained was also for tile firing. This was for ten furnaces, each with a working space of 11 ft. by 7 ft. 6 in. by 5 ft. The following will give some idea of the size of this installation:

The service pipe to the factory will be an 8-in. cast-iron main.

The meter will be a 3000 light, capable of passing 20,000 c.ft. of gas per hour.

The estimated annual consumption will be 50 million c.ft.

Six coal-fired ovens will be demolished to make way for the new gas-fired furnaces.

This will appreciably reduce the amount of smoke emitted to the atmosphere in that neighbourhood.

The type of furnace employed for these processes is novel, and a short description may be of interest. The structure is rectangular, with an arched crown on the short cross section. The hearth is solid and carries a low superstructure for placing the cranks or bats.

The gas enters at ports at points near the hearth on the long sides of the furnace, sweeps upwards and out at ports on the opposite sides of the furnace. Below the hearth are constructed two regenerative chambers of checkered brickwork. The products of combustion are passed through these chambers, and the heat carried away is thus given up to the brickwork.

Arrangements are made whereby the incoming air necessary to support the combustion is made to pass through these chambers and to re-introduce to the working space a large part of the heat carried away by the products of combustion. It is by means of high furnace efficiency that gas is able to compete with coal.

BIG TEMPERATURE RANGE.

A novel feature of these furnaces is that the Bunsen burner is not used, but gas, without primary air, is admitted to the furnace through the side ports. At the same time, a highly oxidizing atmosphere, so important in pottery firing, is easily maintained throughout the furnace. This is done by means of special arrangements for the air supply, without relying on the velocity of the gas at injectors for the air required.

The temperature range of these furnaces is from 800° C. to 1400° C. Temperatures up to 1700° C. have been obtained with specially constructed furnaces, and in one case, as an experiment, the furnace was fired until the bricks fused and collapsed.

Thus, for all practical purposes, temperature is easily obtained and maintained at any point, and, if necessary, this may be done automatically. Another important point is that the entire capacity of the working space is within 5° of uniform temperature.

REGISTER OF PATENTS

Carburetted Water Gas.—No. 355,099.

HUMPHREYS & GLASGOW, LTD., of Westminster (Assignees of JANEWAY, P. W., of Media, Pennsylvania).

No. 31,396; Oct. 20, 1930. Convention date, Nov. 21, 1929.

According to this invention, during the latter half of the regular air blasting of the generator fuel bed, when the carbon monoxide content of the resultant blast gases has become high and the carbon dioxide low, and the blast gases have appreciable calorific power, these blast gases are led to storage, instead of being burned in the carburettor and superheater, and the burned gases being passed to atmosphere. In other words, what is known as a "blow-run" is made. During this blow-run high coke forming oil is introduced to the top of the generator, spraying it on the fuel bed. The blow-run is followed by an up-run water gas step, and the introduction of oil to the top of the generator may be continued throughout the up-run. It is preferable to get the total oil to be employed in the generator into the generator as soon as possible, so as to allow the maximum time for vaporization. Therefore, it may be desirable to introduce all the oil to be introduced to the generator during the blow-run or during the blow-run and the first part of the up-run.

Preferably the up-run is followed by a down-run with steam passed reversely through the set, to recuperate heat from vessels, such as the usual carburetting vessels, and carry it back to the generator, to dry out and coke the oil residues left on the top of the fuel bed, recovering this unvaporized volatile matter remaining after the up-run, to prevent its combustion during the succeeding air blast, and to prepare the oil residues for subsequent use in supplementing the generator fuel in water gas production.

Lubrication of Guide Rollers.—No. 355,606.

R. & J. DEMPSTER, LTD., and WALKER, L. J. L., both of Manchester.

No. 35,213; Nov. 22, 1930.

This invention relates to the type of lubrication proposed for the axles of guide rollers employed in spirally guided gasholders, in which the lubricant is passed under pressure through pipes or to the axles. The object is a particular application of this principle to the axles and/or carriages of guide rollers of the kind wherein the rollers are provided in multiple form for each carriage aforesaid. The inlets for lubricant for all or several of the roller axles in each carriage are grouped together by communications which terminate at a container of the lubricant, and from which the lubricant is supplied under pressure; but the container is situated on the dip portion of a lift, or, alternatively, on the tank side of the gasholder.

Heating Stoves.—No. 354,153.

RUTTEN, J., of The Hague.

No. 243; Jan. 2, 1931.

This invention relates to gas heating stoves of the closed type, wherein the combustion air, drawn from the atmosphere, on its way to the burner and thence in the form of burnt gases to the discharge opening (preferably located in close proximity to the air inlet opening) flows through a conduit not having any communication with the room to be heated, so that it is impossible for the burnt gases to escape into the room even under unfavourable weather conditions.

In the use of heating stoves of this type it has been found that, under special weather conditions, the direction of flow of the burnt gases in the discharge pipe is reversed, whereby during a certain time the supply of fresh combustion air to the burner is cut off and the flame is suddenly extinguished. This invention has for its primary object to obviate this drawback. With this object in view the stove proper is so arranged that the space from which the burners directly draw the primary combustion air is separated from the space into which the secondary air is admitted and in which the combustion takes place. With this arrangement, the flame cannot go out if during a certain period no secondary air can reach the flame, because the amount of primary air drawn in by the gaseous fuel flowing out of the gas nozzle suffices to keep up incomplete combustion.

Gas Ignition Devices.—No. 355,219.

HORSTMANN, F. O., HORSTMANN, J. H. G., and the HORSTMANN GEAR COMPANY, LTD., all of Bath.

No. 14,516; May 12, 1930.

This invention relates to means for igniting gas burners from a distance, and the object is to provide means whereby the use of a by-pass in conjunction with remote control mechanism is eliminated. A wire filament is provided adjacent to the burner, suitably protected from damage due to mechanical fracture, or excessive heat. This filament is electrically heated during the operation of opening the valve for the admission of gas to the burner. The filament is made of a substance such as platinum having catalytic properties in contact with gas, so that the presence of the gas will intensify the glow of the filament and thus cause the burner to be more readily ignited. The source of energy for heating the filament may be any suitable type of battery or generator, the wire filament being suitably graded for various electric voltages.

As a means for making electric contact between the source of electric energy and the filament, the patentees arrange that the lever normally employed for the mechanical operation of the valve shall also embody an electrical make-and-break mechanism so designed that normally no electric contact is made, but that when pressure is applied in the act of moving the lever, for the purpose of turning on the gas, electric contact is made for heating the filament, contact being automatically broken when the lever is no longer held.

Prepayment Mechanism.—No. 355,403.

SOUTH METROPOLITAN GAS COMPANY, HART, C. A., and COLEMAN, E., all of 709, Old Kent Road, S.E. 15.

No. 17,544; June 6, 1930.

This invention relates to coin-freed apparatus for meters, which can be actuated by any one of a plurality of coins of different value. The main object is to provide apparatus which is simpler and has fewer pivoted or other moving parts than apparatus heretofore commonly in use, in order thereby to provide apparatus which is less liable to get out of order. Coin-freed apparatus constructed according to this invention comprises a hand-actuated chute forming a coin receiving slot member adapted to receive and automatically to locate coins of different denomination, a valve control member, a shaft for actuating the valve control, and a coin actuated shaft, the whole being so arranged that the coin employed directly engages the coin actuated shaft or a shaft geared thereto, to transmit the drive to the valve control actuating shaft, and finally falls back out of the mouth of the chute.

Parliamentary Intelligence.

[From Our Special Correspondents.]

House of Lords.

Private Bill.

The Kilmarnock Gas (Provisional Order) Bill has received the Royal Assent.

Special Order.

The Coatbridge Gas Order has been passed by the Special Orders Committee and approved by the House.

House of Commons.

Private Bills.

The following Private Bills, dealing with the Gas Industry, have been deposited for the 1932 session: Commercial Gas; Gas Light and Coke Company; Kettering Gas; Mid-Southern Utility; Oakham Gas and Electricity; Scarborough Gas; South Metropolitan Gas; South Suburban Gas; Brownhills Urban District Council.

Legal Intelligence.

£650 Compensation for Man's Death at Gas-Works.

In the Bow County Court, on Friday, before Judge Thompson, K.C., there was an application by Winifred Mary Heather, of Silvertown, E., the respondents being Messrs. Fraser & Chalmers, Engineering Works, Erith, Kent. It appeared that on Feb. 5, the applicant's husband, Stewart Heather, was at the Beckton Gas-Works applying for work. He was standing outside the office, waiting to see the foreman, when a scaffold pole, which was on the roof of an adjoining building where work was being carried out by the respondents, fell on him, and he succumbed to his injuries. The defendants had admitted their liability, and the sum of £650 had been paid into Court in full settlement of the action, £500 for the widow, and £150 for the child.

Judge Thompson agreed the terms of the settlement.

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

The chief item of interest on the Stock Exchange last week was the wide fluctuations in the prices of British Funds. At the commencement the fall in the value of sterling brought with it a large number of selling orders, chiefly from abroad, which caused a sharp set-back in prices, and at one time 5 p.ct. War Loan was changing hands at 92½. As the week progressed sterling improved, and the whole list of Government stocks more than recovered from the early depression and closed higher than the previous week. There has been of late an all-round tendency for prices to show rapid fluctuations, and the main reason for this is attributed to the reluctance on the part of dealers, owing to the existing uncertain conditions, to hold stock for future requirements, so that with any selling movement, prices are speedily marked down and just as speedily recover again when the position is reversed. Holders of gilt-edged securities for income purposes have no need, therefore, to be alarmed unduly at these sudden price changes.

Similar conditions also prevailed in the Gas Market. Sellers were in the majority; and as funds normally available for investment will shortly be required for tax purposes, there were fewer buyers than usual and dealers had a little difficulty at times in finding purchasers. The result was that prices in some instances were a trifle below those of the previous week, and quotations were affected accordingly. Gas Light £1 units dropped a further 3d. to 18s., the lowest price this year, and, on the basis of last year's dividend of £5 12s., the yield at this price works out at £6 4s. 5d. p.ct. This is an unusually high return on the stock of our premier undertaking and presents an attractive investment. When it is remembered that at one time during the year the stock was changing hands at 20s. 9d. it is not unreasonable to anticipate that, apart from the high yield, some capital appreciation may also accrue on a purchase at the present price, subject, of course, to the disbursement of a similar rate of dividend for the current year.

Imperial Continental ordinary was also affected by the prevailing conditions, dropping 15 points to 320, and a few debentures weakened, the chief among these being the Gas Light 4½ p.ct., which fell 4 points to 88½. On the other hand, a sharp rise of 10 points to 84½ was recorded by Shrewsbury 5 p.ct. stock. This stock was first quoted on the London Exchange in October last, and so far only one transaction (at 75) has been recorded; but, as a dividend of 6¾ p.ct. has been paid for the past three years, the present price is still on the low side. Apart from this the only other increases were in Liverpool ordinary by 1 point to 97½, and Newcastle £1 units by 3d. to 16s. 3d., both at the local Exchanges.

Current Sales of Gas Products.

The London Market for Tar and Tar Products.

LONDON, *Dec.* 14.

The values of tar products remain unchanged and are as follows:

Pitch is from 65s. to 70s. per ton f.o.b.

Creosote, for export, varies from 3¾d. to 5d. per gallon f.o.b., according to specification.

Pure toluole is firm at about 2s. 6d. per gallon; benzole is 1s. 8d. to 1s. 9d. per gallon; 95/160 solvent naphtha, about 1s. 5d. to 1s. 6d. per gallon; and pyridine bases, 3s. 9d. to 4s. per gallon.

Tar Products in the Provinces.

Dec. 14.

The average prices of gas-works products during the week were: Gas-works tar, 22s. to 26s. Pitch—East Coast, 55s. to 56s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 55s. to 56s. f.o.b.* Toluole, naked, North, 1s. 8d. to 1s. 8¼d. Coal-tar crude naphtha, in bulk, North, 5d. to 5¼d. Solvent naphtha, naked, North, 1s. 3d. to 1s. 3½d. Heavy naphtha, North, 11d. to 11½d. Creosote, *ex* works, in bulk, North, liquid and salty, 3¼d. to 3½d.; low gravity, 1¼d.; Scotland, 3¼d. to 3½d. Heavy oils, in bulk, North, 5d. to 5¼d. Carbolic acid, 60's, 1s. 6¼d. to 1s. 7d. Naphthalene, £9 to £10. Salts, 50s. to 70s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Dec.* 11.

The demand for refined tar is still quite considerable for the time of the year; but other products remain rather quiet, although quotations are unchanged.

Pitch.—Home business is still being conducted at 60s. to 62s. 6d. per ton *ex* makers' works in bulk. Export value is nominal at 60s. per ton f.o.b. Glasgow.

Refined tar to Ministry of Transport Specification is steady at 4d. to 4¼d. per gallon f.o.r. makers' works naked, with forward offers difficult to secure.

Creosote.—There is a fair demand with supplies low. B.E.S.A. Specification is 2¾d. to 3d. per gallon; low gravity, 3¼d. to 3½d. per gallon; and neutral oil, 3¼d. to 3½d. per gallon—all *ex* works in bulk.

Cresylic.—Very few orders are being placed and prices are easy. Pale, 97/99 p.ct., is 1s. 2½d. to 1s. 3½d. per gallon; dark, 97/99 p.ct., 1s. 1½d. to 1s. 2½d. per gallon; and pale, 99/100 p.ct., 1s. 4½d. to 1s. 5d. per gallon—all f.o.r.

Crude naphtha.—Price remains steady at 4½d. to 5d. per gallon, according to quality.

Solvent naphtha.—Quiet with quotations irregular. 90/160 grade is 1s. 3d. to 1s. 4d. per gallon, and 90/190 grade 1s. to 1s. 1d. per gallon.

Motor benzole.—Plentiful supplies are available, and value is 1s. 3d. to 1s. 4d. per gallon f.o.r. in buyers' rail tanks.

Pyridines.—90/160 grade is 3s. to 3s. 3d. per gallon, and 90/140 grade 3s. 3d. to 3s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole	0	7	to	0	7½	per gallon at works
Motor "	1	2	"	1	3	" " "
Pure "	1	6	"	1	7	" " "

New Capital Issues.

Godalming Gas and Coke Company, Ltd.—As will be seen from our advertisement columns, Messrs. A. & W. Richards are offering for sale by tender, on behalf of the Directors of this Company, £5000 6 p.ct. debentures of £100 each to be redeemed at par on Jan. 1, 1942. Tenders must be received not later than 11 a.m. on Monday, Dec. 21.

Trade Notes.

Purifier Work at St. Helens.

Messrs. Newton, Chambers, & Co., Ltd., of Thorncliffe, near Sheffield, have just received an order from the St. Helens Corporation Gas-Works (subject to the sanction of the Ministry of Health) for four cast-iron purifiers, 40 ft. square by 6 ft. deep; also for dismantling, repairing, removing, and re-erecting four existing purifiers, 35 ft. by 17 ft. 6 in. by 5 ft. 6 in. deep.

Stanton Ironworks Company, Ltd.

The Stanton Ironworks Company, Ltd., near Nottingham, having acquired a financial interest in Wilson Brothers Pipe Fittings, Ltd., of Bridgeton Foundry, Glasgow, have entered into a working arrangement whereby the Glasgow works will be utilized by Stanton for assisting in dealing with Scottish orders, and also for enabling the Stanton Company to carry a varied stock of their standard sand cast and De Lavaud spun iron pipes, and specials, for Scottish requirements.

Gas Acts (1920 and 1929) Orders.

SPECIAL ORDERS.

Ormskirk District Gas Company.

To authorize the Company to borrow on mortgage of their undertaking, or by the creation or issue of debenture stock, any sum or sums not exceeding in the whole (including sums borrowed by the Company under existing powers and outstanding at the date of the Order) 80 p.ct. of the paid-up capital (including premiums), and to provide for the redemption of borrowing powers in the event of the redemption of paid-up capital by an amount equal to 80 p.ct. of the paid-up capital so redeemed.

Sheffield Gas Company.

To transfer to the Company the undertaking of the Elsecar, Wentworth, and Hoyland Gas Company; to prescribe the consideration to be paid; and to prohibit the Rotherham Corporation supplying gas in any part of the parish of Wentworth in which they had not laid down mains prior to Nov. 25, 1931.

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Dec. 12. (Provincial Exchanges Dec. 11.)	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
1,551,868	Stk.	Oct. 5	7⅛	7⅛	Alliance & Dublin Ord. ...	100—105	...	...
374,000	,,	July 9	4	4	Do. 4 p.c. Deb. ...	67—72	...	...
522,655	,,	Aug. 24	7	7	Barnet Ord. 7 p.c.	120—125	...	122½—123
300,000	1	Oct. 19	1/9⅜	1/4⅜	Bombay, Ltd.	15/—17/6	...	...
174,500	10	Aug. 10	9	9	Bournemouth 5 p.c. ...	14⅜—15⅜	...	...
500,050	10	,,	7	7	Do. B 7 p.c. ...	12—13	...	12⅞—12⅞
439,160	10	,,	6	6	Do. Pref. 6 p.c. ...	10¼—11¼	...	...
50,000	Stk.	June 25	3	3	Do. 3 p.c. Deb. ...	55—60	...	...
162,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	75—80	...	...
357,900	,,	Aug. 24	7½	7½	Brighton & Hove 6 p.c. Con.	114—119	...	...
371,880	,,	,,	6⅔	6⅔	Do. 5 p.c. Con.	104—107	...	105½
1,387,500	,,	July 23	5	5	Bristol 5 p.c. max.	88—90[a]	...	...
120,420	,,	June 25	4	4	Do. 1st 4 p.c. Deb. ...	78—80[a]	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	78—80[a]	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	98½—99½[a]	...	...
855,000	,,	Oct. 5	8	7	British Ord.	108—113	...	110—111
100,000	,,	June 25	7	7	Do. 7 p.c. Pref. ...	110—115	...	111
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	70—75	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	92—97	...	...
160,000	,,	June 25	5	5	Cambridge 5 p.c. Deb. ...	92—97	...	...
100,000	10	Nov. 30	8	6	Cape Town, Ltd.	8½—9¼	...	8¾—9
100,000	10	Oct. 30	4½	4½	Do. 4½ p.c. Pref. ...	6¾—7¼	...	...
150,000	Stk.	June 25	4½	4½	Do. 4½ p.c. Deb. ...	65—70	...	...
626,860	,,	July 23	6	6	Cardiff Con. Ord.	95—98	...	...
237,860	,,	June 25	—	2½	Do. 5 p.c. Red. Deb.	90—95	...	...
157,150	,,	Aug. 10	6¼	5	Chester 5 p.c. Ord.	86—91[b]	...	...
98,936	1	Oct. 5	1/2/-	2/-	Colombo, Ltd. Ord.... ...	27/—32/-	...	...
24,500	1	,,	1/4¼	1/4¼	Do. 7 p.c. Pref.	17/—19/-	...	...
609,204	1	Oct. 19	1/3'27	-/10'90	Colonial Gas Assn. Ltd. Ord.	10/—15/-	...	10/6—11/3
296,053	1	,,	1/5'67	1/2'54	Do. 8 p.c. Pref.	10/—15/-	...	...
2,078,280	Stk.	July 23	6	6	Commercial Ord.	92—95	...	92½
475,000	,,	June 11	3	3	Do. 3 p.c. Deb. ...	52—57	...	...
787,560	,,	Aug. 10	7	7	Croydon sliding scale ...	107—110	...	107¼—108½
458,100	,,	,,	5	5	Do. max. div.	81—84	...	82¼—83½
542,270	,,	Aug. 24	10	7	Derby Con.	120—125[c]	...	...
55,000	,,	June 25	4	4	Do. Deb.	65—70[c]	...	...
209,000	,,	Sept. 7	5	5	East Hull Ord. 5 p.c. ...	71—76	...	...
1,002,180	,,	Sept. 21	16½	14	European, Ltd.	100—110	...	99—105
18,958,033	,,	July 23	5⅝	5⅝	Gas Light & Coke 4 p.c. Ord.	17/6—18/6/	-/3	17/6—18/1½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	54—59	-1	55—56½
4,294,691	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	70—75	...	71—72½
5,694,095	,,	June 11	3	3	Do. 3 p.c. Con. Deb. ...	53—58	...	54—55½
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	95—100	...	95
2,500,000	,,	,,	—	4½	Do. 4½ p.c. Red. Deb. ...	86—91	-4	89—91
161,480	,,	Sept. 7	10	10	Harrogate Cons. 10 p.c. max.	157—162	...	...
82,500	,,	Aug. 24	7	7	Hastings & St. L. 5 p.c. Conv.	95—100	...	...
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	80—85	...	84½
70,000	10	9 Oct. '30	5	10	Hongkong & China, Ltd. ...	12½—13½	...	...
213,200	Stk.	Aug. 10	6	6	Hornsey Con. 3½ p.c. ...	89—92	...	...
2,800,000	,,	Oct. 30	25	15	Imperial Continental Cap.	310—330	-15	315—335
228,180	,,	Aug. 10	3½	3½	Do. 3½ p.c. Red. Deb.	70—75	...	...
285,242	,,	Aug. 10	8½	8½	Lea Bridge 5 p.c. Ord. ...	129—132	...	...
2,145,907	,,	Aug. 24	6	6	Liverpool 5 p.c. Ord. ...	97—98[b]	+1	...
306,083	,,	July 15	4	4	Do. 4 p.c. Deb. ...	79—81[b]	...	...
165,736	,,	Aug. 24	9	8	Maidstone 5 p.c. Cap. ...	123—128	...	...
63,480	,,	June 25	3	3	Do. 3 p.c. Deb. ...	55—60	...	...
75,000	5	Nov. 30	†10	†10	Malta & Mediterranean ...	6¾—7*	...	...
392,000	—	Oct. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	78—83	...	...
171,978	Stk.	Aug. 24	5	5	M. S. D. Utility "C." Cons.	76—81	...	76½—78
522,992	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	67—72	...	...
675,000	,,	May 21	†6	†6	Montevideo, Ltd.	70—80	...	...
2,061,315	,,	Aug. 10	5⅔	5	Newcastle & Gateshead Con.	157/9—16/9[d]	+/3	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	68—70[d]	...	...
691,705	,,	June 25	3½	3½	Do. 3½ p.c. Deb. ...	69—71[d]	...	...
277,285	,,	Oct. 30	5	5	Do. 5 p.c. Red. Deb.	96—98[d]	...	...
199,940	,,	Aug. 24	7½	7½	North Middlesex 6 p.c. Con.	105—110	...	...
396,160	,,	Aug. 10	5	5	Northampton 5 p.c. max. ...	74—79	...	...
300,000	,,	Nov. 30	7	9	Oriental, Ltd.	88—98*	-2	...
69,000	5	18 May, '15	—	—	Ottoman	0—¼	...	...
205,162	Stk.	June 25	8	8	Plym'th & Stonehouse 5 p.c.	110—115	...	...
424,416	,,	Aug. 24	8	8	Portsm'th Con. Stk. 4 p.c. Std.	119—124	...	...
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	76—79	...	...
696,312	,,	July 23	4	4	Primitiva 4 p.c. Rd. Db. 1911	83—86	...	...
389,813	,,	June 25	4	4	Do. 4 p.c. Cons. Deb.	84—87	...	86—86½
150,000	10	Sept. 21	6	6	San Paulo 6 p.c. Pref. ...	7½—8	...	...
1,736,968	Stk.	Sept. 7	6⅔	6	Sheffield Cons.	103—105[e]	...	...
95,000	,,	July 9	4	4	Do. 4 p.c. Deb.	79—81[e]	...	...
133,201	,,	Sept. 7	5	8½	Shrewsbury 8 p.c. Ord. ...	82—87	+10	...
90,000	10	June 11	15	15	South African	9½—5½	...	...
6,709,895	Stk.	July 23	7½	5	South Met. Ord.	97—100	-1	97½—99½
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	103—108	...	...
1,895,445	,,	July 9	3	3	Do. 3 p.c. Deb. ...	53—58	...	...
1,000,000	,,	July 23	4	5	Do. 5 p.c. Red. Deb.	93—99	-1½	...
91,500	,,	Aug. 10	8½	8½	South Shields Con.	108—110[d]	...	...
1,543,795	,,	Aug. 10	6¼	6¼	South Suburban Ord. 5 p.c.	101—104	...	103
668,837	,,	June 25	5	5	Do. 5 p.c. Deb.	92—97	...	...
647,740	,,	Aug. 24	5	5	Southampt'n Ord. 5 p.c. max.	76—79	...	...
121,275	,,	June 25	4	4	Do. 4 p.c. Deb.	70—75	...	...
250,000	,,	Aug. 24	7	7	Swansea 7 p.c. Red. Pref. ...	96—99	...	...
200,000	,,	June 25	6½	6½	Do. 6½ p.c. Red. Deb.	99—102	...	...
1,076,490	,,	Aug. 10	6⅔	6⅔	Tottenham and District Ord.	103—107	...	106½
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	93—98	...	...
199,005	,,	June 11	4	4	Do. 4 p.c. Deb.	70—75	...	...
85,701	,,	Sept. 21	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	72—77	...	...
310,694	,,	Aug. 24	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	100—105	...	...
88,380	,,	,,	5	5	Do. 5 p.c. Pref. ...	85—90	...	...
1,322,220	,,	July 9	7	7	Wandsworth and District: Consolidated	111—114	...	111
371,378	,,	,,	5	5	Do. 5 p.c. Pref.	90—95	...	...
1,167,964	,,	June 25	5	5	Do. 5 p.c. Deb.	94—99	...	96½

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax. ‡ For year. § Div. = 10 p.ct. p.a. less tax and less tax on interim dividend.

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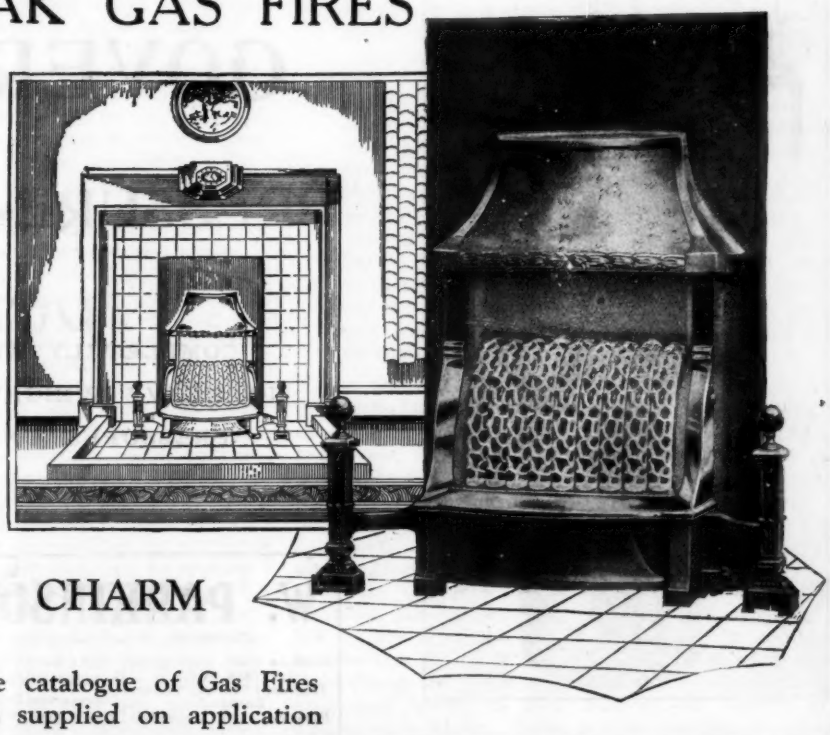

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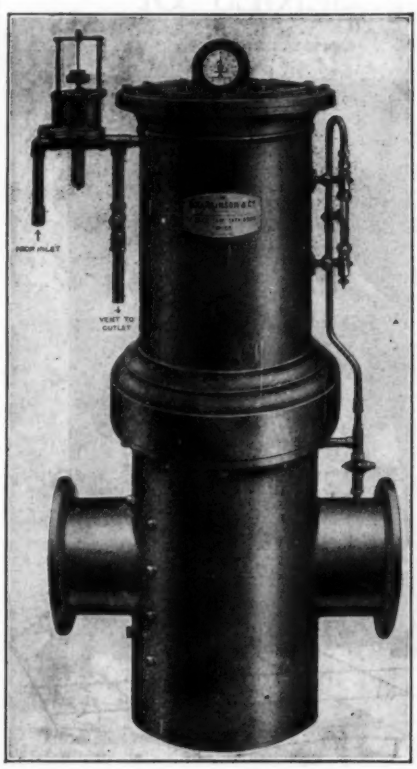

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